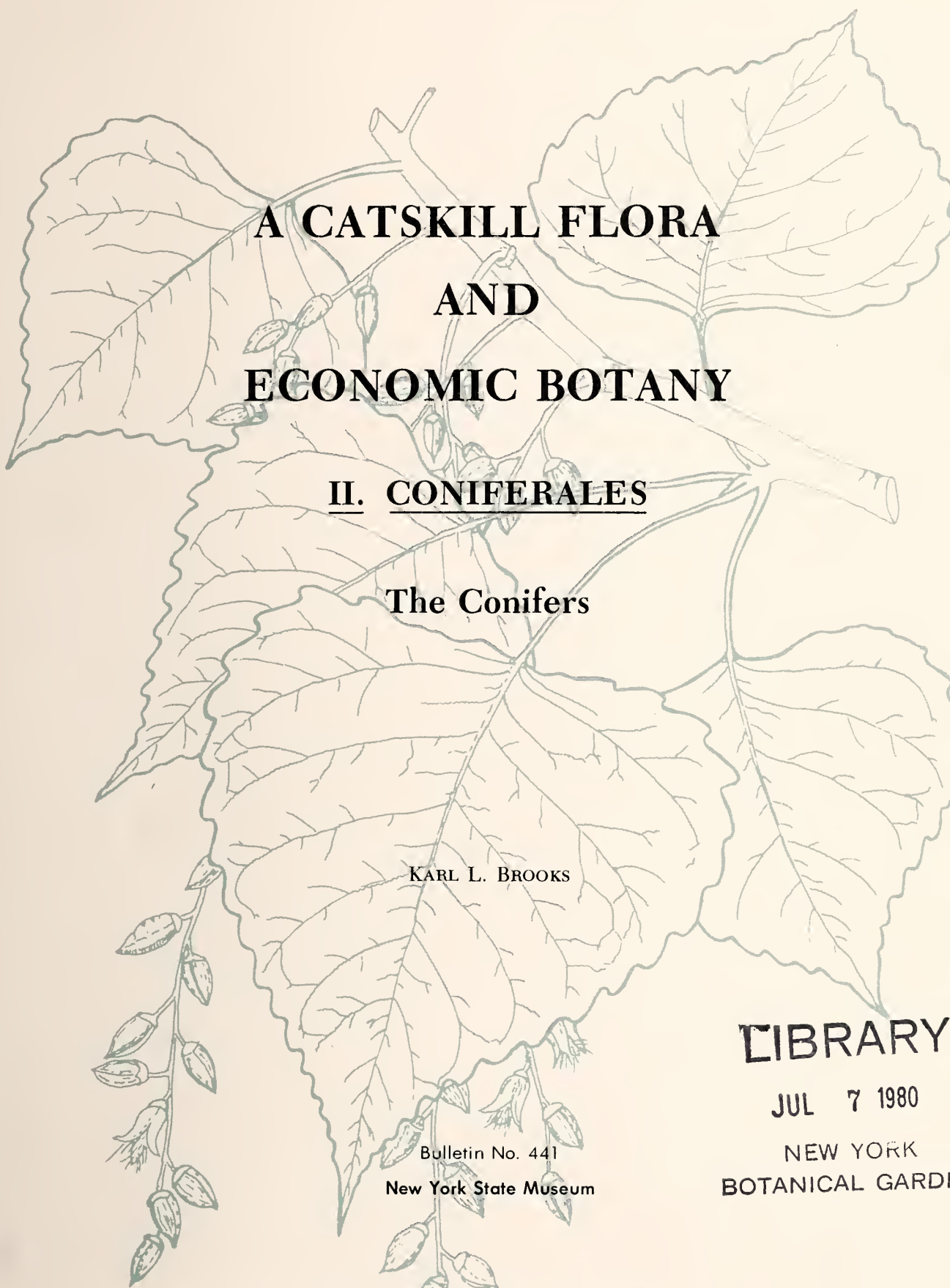


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A CATSKILL FLORA AND ECONOMIC BOTANY

II. CONIFERALES

The Conifers

KARL L. BROOKS

Bulletin No. 441

New York State Museum


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DEDICATION

My studies of the Catskill flora
are dedicated
to my good wife
MARGUERITE

EDITOR'S PREFACE

This is the work of an amateur botanist whose many years of collection and study of Catskill plants make him the person most qualified to produce such a treatment in the tradition of the old herbals. We at the Botany Office of the New York State Museum feel that this type of publication is a useful adjunct to our efforts to produce a comprehensive state flora. The author's intimate knowledge of the area and its plants makes this a valuable work for those who are native to the Catskills as well as for the many summer visitors. Medical and food uses of plants, though often only of historical interest, round out the treatment, and make this publication what it is intended to be--a source book for those interested in reading and learning about the Catskill flora. Indeed, since the vast majority of the plants discussed are widely distributed throughout the northeastern states and adjacent Canada, this work should also be of interest far beyond the narrow confines of the Catskill region.

IMPORTANT NOTE

All economic uses, folklore, medical and pharmaceutical notes, uses as foodstuffs, etc., are compiled from the literature and do not represent an endorsement by the author or the New York State Museum. Some of the uses may, indeed, be dangerous if incorrectly employed. Some are not effective and are presented for historical interest only.

PREFACE

The Catskills have long been known for their unusual beauty, healthful climate, and their natural resources for recreation, not the least of which is their abundant wildlife and in some respects a unique flora. While it is true that a large percentage of the plants growing naturally in the Catskills also occur throughout most of the northeastern states and adjacent Canada, many species are rare, only locally abundant, or do not occur elsewhere in the eastern states. Some are northern elements found only on the high peaks, and others appear to have been stranded in isolated areas following the retreat of the last glacier some 10,000 years ago. But whether rare in distribution or more abundantly widespread, no plant is completely devoid of interest, and many have had a long and varied association with man that goes back over many millennia.

A study of the flora of any region can be a richly rewarding experience, and that of the Catskills is no exception. Simply getting to know what plants grow in a particular area brings one closer to an understanding of the wonders of nature, but it has long been my contention that just knowing a plant by name is only the beginning. What is its relationship to other plants, both wild and cultivated? Of what value is it to man and to wildlife? Is it edible, a source of dye, useful as a medicine, or is it just an obnoxious weed? How can it be prepared for the table? For what was it prescribed? How can one get rid of it? Answers to such questions not only lead us down many intriguing paths, but also contribute much to our understanding of the intricacies of the biosphere.

My work on the Catskill flora during the last quarter of a century has therefore a three-fold objective: (1) to determine precisely what species grow in this area, (2) to chart the known distribution of each species in the Catskills, and, (3) for each, to collect as much information as possible concerning its value to man and to wildlife. These objectives have led to many hours of work in the field collecting specimens and making observations of the plants seen plus countless others in libraries and herbaria to obtain information on their distribution and use.

This work was written primarily for the serious amateur with a desire to know more about the plants growing in the northeastern states and adjacent Canada, with particular emphasis upon those occurring in the Catskills. In these times of increasing concern for man's impact upon the environment, the dwindling food supply in relation to increased population pressure throughout the world, inflation, and the rising desire of a large segment of the people to return to fundamentals, as it were, it is hoped that the emphasis given to economic botany, and to the importance of our native flora to wildlife, will fill a basic need. So far as the writer is aware, this is the first time that detailed information on food, drug, and dye plants has been assembled in a compilation that includes the common weeds as well as the more obscure components of our flora such as the grasses and sedges, which most popular field guides ignore completely.

In addition, "plant biographies" summarizing basic data concerning the name, type of plant, range, distribution, origin, and time of flowering (or fruiting) are provided for each plant occurring in the Catskills, together with some remarks on other salient facts of the plants in question. Detailed distribution maps showing by township the localities where each species has been observed are supported by data culled from the literature and an examination of herbarium specimens, in addition to many thousands of observations in the field. The citation of observations is a comparatively recent innovation in helping to determine the distribution of the many species making up our flora; in addition, so far as the writer is aware, never before have photographs been cited as evidence for the occurrence of a particular species in any given area, thus placing them almost on a par with herbarium specimens. In view of the number of rare and endangered species now stringently protected by law, this practice is likely to attain increased importance. These data, together with the keys, illustrations, and detailed notes on each of the various species, should help the serious student not only to identify the plants in question, but to provide the basic knowledge that will enable him to view the plant world as a vital part of the planet on which he lives.

In collecting and organizing this information, the writer has attempted to proceed from the general to the more specific, starting with the orders into which the various plant families are organized, then presenting some ideas on their evolution and possible relationships to each other, together with comments on both wild and cultivated plants, in the hope that such an overview will provide a more meaningful picture of each group of plants. The families making up each order of the Catskill flora are then presented (in "manual" order), with an attempt to relate any cultivated plants in that family to their wild cousins before going on to a discussion of the wild species themselves. Where possible, information on their economic value to man and to wildlife has been supplied. With few exceptions, genera are arranged alphabetically under families, and species are arranged alphabetically under genera. To aid in the identification of the various species, keys to genera and species are included, and illustrations of the various species have been chosen with considerable care.

Some may object that such an accumulation of material is not truly a flora, but that is a matter of definition. In any case, such a study is not only its own reward, but a knowledge of the world of plants and their relationships to wildlife and to man, not to mention an enjoyment of the natural world as opposed to the artificial concrete jungles of our modern cities, brings a perspective not to be attained in any other way. This may perhaps seem to be getting far afield, but all the world is an intricately balanced biosphere, and man must not only understand its complexities, but must also be able to accommodate himself to its demands if he, himself, is to survive as a species.

A work of this nature could not have been completed without the help and encouragement of a number of people. My wife, Marguerite, has borne the brunt of my numerous idiosyncrasies, both as a constant companion in the field and as a demanding editor and critic. The late Stanley J. Smith, curator of botany at the New York State Museum, not only spent countless hours checking my specimens and graciously permitted access to the state's

records on plant distribution, but has also been mentor and companion in the field on many occasions, to say nothing of his continuing advice and encouragement for over a quarter of a century. In addition to supplying moral support and companionship in the field, Paul Huth, who fell heir to the Domville-Dunbar records of the Ulster County flora, was kind enough to check through several thousand cards to extract information pertaining to collections and observations made in the Catskill region of that county.

More than thanks are due to Elizabeth G. Hall, formerly librarian at The New York Botanical Garden, whose vast knowledge of botanical source material seems inexhaustible and whose boundless enthusiasm is infectious. She has been unfailing in digging out elusive books and suggesting sources of information in addition to supplying many details concerning earlier workers in the field. Librarians at both the Horticultural Society of New York and at The New York Botanical Garden have also been most helpful. Last, but in no way least, thanks are due to Patricia Holmgren, herbarium supervisor and administrator of the phanerogamic herbarium at The New York Botanical Garden, and to George Kalmbacher, curator at the Brooklyn Botanic Garden, for permission to check specimens in the herbaria at those institutions.

The writer wishes also to express his appreciation for permission to reproduce the illustration of Pinus sylvestris from The Book of Trees by William C. Grimm, copyright, 1962, by The Stackpole Company, Harrisburg, Pa. Permission to quote from A Natural History of Trees of Eastern and Central North America by Donald Culross Peattie, copyright, 1948, 1949, 1950, by Donald Culross Peattie, is likewise gratefully acknowledged. Reprinted by permission of Houghton Mifflin Company, Boston.

Karl L. Brooks

Brooklyn, New York
16 April 1979

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SPERMATOPHYTES

This division is made up of the seed plants. It has been differentiated classically from the Pteridophyta and other taxa by the formation of pollen tubes and the production of seeds--criteria that have lost their validity as distinguishing characteristics resulting from discoveries over half a century ago that certain ancient fernlike plants bore seeds. It is now recognized that the seed character is insufficient to set the angiosperms and gymnosperms apart from the ferns, clubmosses, and horsetails. The Spermatophyta have traditionally been divided into two subdivisions--Gymnospermae and Angiospermae, the so-called coniferous plants and the flowering plants.

GYMNOSPERMAE

The gymnosperms bear seeds, but they are not flowering plants. The one character that is constant in this group of plants and until recently has set it apart from the rest of the plant kingdom is expressed in the term gymnosperm, which means "naked seed," for by classical definition the seeds of this taxon are produced from naked ovules borne on the surface of the megasporophyll (cone scale or carpel). With these are associated other characters, but exceptions are to be found to all these characters in so far as distinctions between the Gymnospermae and the Angiospermae are concerned.

The gymnosperms are an ancient group of plants, by many botanists classified into 8 orders, of which 3 are extinct. Of the living gymnosperms, the more important groups are the cycads (including the Bread Palm [actually not a true palm]), the Ginkgo or Maidenhair Tree (of which there is only one species), and the conifers. They comprise a major forest group of primarily temperate regions of both northern and southern hemispheres. Phylogenists consider them to be remnants of a once large and diverse group that was dominant in the Mesozoic.

CONIFERALES

The Coniferales are widely distributed over the world, and many of the species are important members of great forest communities. Seven families of conifers are generally recognized, but the classification of living conifers is by no means satisfactory. The pines and their relatives are an ancient race, composed of proud old "first families," for they were differentiated from a cordaitalean ancestry during late Carboniferous times long before other modern tree families had evolved, since there were then no broad-leaved trees. The conifers are now declining, for they had reached their prime as a race when the broad-leaved trees first appeared upon the earth. Nevertheless, they inhabit regions where austere conditions discourage all but a few broad-leaved trees.

The conifers, like other taxa comprising the gymnosperms, do not bear flowers, though they reproduce by seeds and not by spores. There is no ovary; the reproductive organs are found in the male and female cones. The naked ovules are borne on the scales of the female cone, which are held apart at blossoming time. They are pollinated by the wind, which dusts them with pollen produced by the male cones clustered on the same tree.

The distinguishing trait of the higher living plants that form the division known as angiosperms is that the ovules are borne in a closed ovary, and the pollen lodges on the end of a stigma. "Pollen tubes" growing down through the style finally reach the hidden ovule, and seed is set.

Key to Local Species of Conifers

1. Leaves arranged in definite clusters, 2
 2. Leaves evergreen, in clusters of 2-5, each cluster surrounded at the base by a short membranous sheath..... Pinus
 2. Leaves deciduous, numerous in clusters on dwarf branches produced laterally on wood of the previous year, alternate or scattered on branches of the current season..... Larix
1. Leaves not in definite clusters, 3
 3. Leaves distinctly opposite or whorled, scalelike (if needle-like, always opposite or whorled), 4
 4. Fruit fleshy, berry-like, blue; leaves not dimorphic in alternating pairs; leafy twigs not flattened..... Juniperus
 4. Fruit a dry cone; leaves dimorphic in alternating pairs, the lateral ones folded and often keeled, those of the upper and lower sides flat or somewhat convex; leafy twigs strongly flattened, a fourth as thick as wide or even thinner..... Thuja
 3. Leaves alternate or scattered, 5
 5. Leaves sessile on the twigs (branchlets persistent; leaves eventually deciduous, leaving round or diamond-shaped smooth scars on the twigs)..... Abies
 5. Leaves jointed at base to a spreading or appressed sterigma (a peglike structure) which is decurrent on the stem and persistent after the leaves have fallen, 6
 6. Leaves quadrangular in cross-section, sessile on the sterigmata..... Picea
 6. Leaves flat, petiolate on the sterigmata, 7
 7. Leaves blunt or retuse, marked with 2 white lines beneath..... Tsuga
 7. Leaves sharp, green on both sides..... Taxus

TAXACEAE, the Yew Family

This is a family of 3 genera and about 13 species, with 2 genera (Torreya and Taxus) occurring only in the northern hemisphere. This is not a primitive family; the apparent gross simplicity of reproductive elements represents a reduction of parts during a long evolutionary period. Species of Torreya and Taxus are cultivated for ornament; the wood of the latter is also used in cabinet work and for archery bows.

Taxus L. Yew.

Lawrence (1951) states that there are 7 species of Taxus, evergreen trees and shrubs native to North America, Europe, north Africa, and Asia. The name of the genus is the old Latin name for Taxus baccata, the European Yew, although some authorities derive the name from taxos,

an ancient Greek word meaning bow, as archery bows were made from the European species before the advent of firearms. Their leaves are flat, mucronate, rigid, and scattered. They grow from all sides of the branch, but, owing to a twist at the base of the leaf, they become arranged in two ranks. They are small, and, in most cases, dark green on wild trees, but they are variable in color on cultivated forms. Male and female cones are usually produced on different trees in early spring. The male sporophylls are yellow and produced in small strobili; the female cones are greenish, very small, and difficult to find. The small, hard, dark green or brownish seed is surrounded, except at the apex, by a fleshy berry like cup (aril) that is red and juicy when ripe.

Yews are among the finest evergreens for landscaping uses. Both the European T. baccata ssp. baccata and T. baccata ssp. cuspidata of eastern Asia are commonly cultivated and have given rise to many horticultural forms, for, in addition to the wild kinds, numerous garden varieties and hybrids show great variation in height, habit of growth, and other important characteristics, making it possible to select from among them those that best suit the gardener's purpose. Yews allowed to grow without clipping or shearing develop into magnificent plants, but they stand pruning well and are among the finest of all evergreens for planting as formal hedges and for topiary work. They can be transplanted without undue difficulty even when quite large. Should they outgrow their allotted space, they can be pruned back severely and will "break" (put forth new shoots) even from thick old branches that have been cut back. In this respect they differ from many other evergreens.

In most parts of North America the Japanese Yew, T. baccata ssp. cuspidata, and its varieties and hybrids are the most valuable for horticultural use. This subspecies is hardier than the English Yew and grows more quickly. It is a native of Japan, Korea, and Manchuria and will withstand the winters of New England. Several varieties are available, including one with bright yellow leaves, a compact, slow-growing one with deep green foliage, and a dwarf, erect columnar kind.

Taxus baccata L. ssp. canadensis (Marsh.) Pilger. American Yew.

Meaning of Species Name. With berries; ssp. name, of Canada.

Synonyms. T. canadensis Marsh in Fernald (1950) and in Gleason (1952).

Other Names. Ground Hemlock, Dwarf Yew, Shinwood, Creeping Hemlock, Canadian Yew.

Type of Plant. A low straggling shrub.

Habitat. Rich woods, thickets, and swamps.

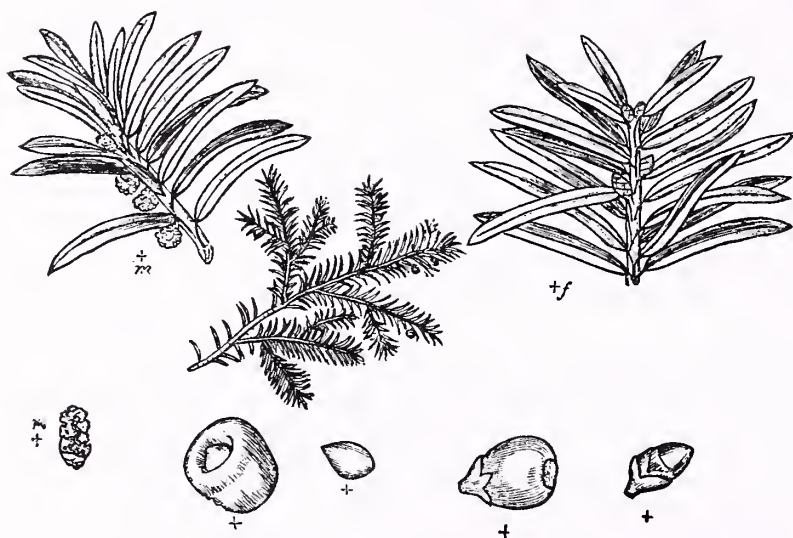
Range. Nf and Que to Man, s to Ct, Pa, Mich, and Minn, with outlying colonies in Va, Ky, O, Ind, Ill, and Ia.

Distr in NYS. Common northw; not known on LI or SI; reported from Westchester co; formerly on "New York Island"; rare or local in the s tier of counties bordering on Pa.

Distr in the Torrey Range. NY: Throughout, except on LI and SI; rare southw, increasing northw.

Elevation. Grows to 2500 ft in the Adirondacks; sea level-3900 ft in the Torrey range.

Time of Fl. Apr-May; Apr 20-May 10 at Cornell.



Taxus baccata ssp. *canadensis*--American Yew
[From Loudon (1844), Vol. 8, p. 355.]

Origin. Native.

Remarks. Pulp of fruit sweet and edible; seeds and wilted foliage poisonous to humans and fatal to livestock.

American Yew is a native of eastern North America, occurring as far north as Newfoundland. It attains a maximum height of about 6 feet but is usually lower and forms a more or less straggling or nearly prostrate shrub. Its foliage does not usually possess the rich, dark green coloring of other yews but tends to be yellowish or brownish, particularly where exposed to sunlight; for these reasons it is less useful as a garden plant. Nevertheless, American Yew can be used to good effect as a ground covering under trees and in woodlands where sheltered conditions can be provided; it is not suitable for planting in exposed, wind swept locations.

In spite of the fact that this yew is poisonous both to humans and to livestock, the American Indians frequently resorted to it for medicinal purposes. The leaves of this species were brewed by the Potawatomis to make a diuretic tea, while the Penobscots employed the twigs to make a tea for treating colds. The Montagnais also used the twigs of this species for a tea used in the treatment of fever and debility associated with flu disorders, but they added a clubmoss to the tea. Leaves of the Pacific Yew, *T. brevifolia*, were supposedly found useful for inducing menstruation. The Chippewas combined small twigs of this species with those of *Juniperus virginiana* to make a decoction used in the treatment of rheumatism. It was sometimes taken internally and sometimes sprinkled on hot stones to create a steam bath.

The European Yew was sometimes used as a source of dye, from which a "tarnished aurora" was obtained, made more brilliant by the addition of a mordant of nitro-muriat of tin. Mordoré (a cinnamon color) was obtained

from the roots and birch bark. In view of these facts, it might be worth experimenting with our native plant, either alone or in combination with other plants.

In Great Britain the European Yew is considered the most dangerous of all poisonous trees and shrubs growing in that area, as the foliage, bark, and seeds are toxic and have proved fatal both to human beings and all classes of livestock. The poisonous properties, referred to by such classical writers as Caesar, Virgil, and Livy, reside chiefly in the foliage and seeds (but not in the aril). If eaten by horses or cattle, the foliage, especially when it has been cut and thrown in heaps so as to undergo a process of fermentation, is very dangerous. Kingsbury (1964) remarks that accidental poisoning from trimmings or prunings are relatively common in Europe. Yew poisoning has not been reported in this hemisphere with as much frequency as in Europe, but cases may occur whenever animals have access to the plant, as they do not seem to find it distasteful. The scarlet fruit is attractive to children; the pulp is not poisonous, but the seed is very likely to contain dangerous concentrations of a poisonous alkaloid. It is of note that the berries are eaten by a number of birds and the foliage is a preferred food of deer and moose.

PINACEAE, the Pine Family

This is a family of resinous woody plants, comprising 9 genera and about 210-220 species of wide distribution, especially throughout the temperate regions of the northern hemisphere. The largest genera are Pinus, Abies, and Picea. In North America Pinus has the widest and most general distribution of all, usually occurring at lower latitudes and elevations in most provinces except the plains areas. In the northern part of our area, in the Pacific states, and generally throughout the cold temperate zone, members of this family constitute the dominant forest growth.

All genera of the Pinaceae are of considerable economic importance for timber, pulpwood, and other forest products. They are important also as a source of naval stores (pitch, turpentine, and resin), Venetian turpentine, Canada balsam, edible seeds, and numerous other products of lesser importance. About 165 species, representing all 9 genera, are cultivated domestically, and the number of horticultural forms and clones is legion.

Abies Mill. Fir.

Fir is the Scandinavian name originally given to the Scotch Pine, Pinus sylvestris, but it is now used in North America to designate members of the genus Abies, all native to the north temperate zone, particularly in Europe, North America, northern Asia, and northern Africa; 9 species occur in western North America, attaining their maximum development in the Sierra Nevada and Cascade ranges. The flat, sessile leaves of firs appear 2-ranked on the horizontal branches. They have a prominent midrib on the whitened lower surface and leave a circular scar when they drop off. The name of the genus is the ancient Latin name of the fir, derived from abeo, to spring up or to rise, referring to the upright

growth of the trees. Many species furnish valuable lumber, and several exotic species are common in cultivation.

The firs are distinguished from other genera of the pine family by their sessile needles, which develop conspicuous circular leaf scars upon falling. Their cones are erect at maturity and disintegrate soon after ripening, leaving the erect, naked central axis attached to the supporting branchlet. No other genus with large cones has this striking characteristic; all other conifers of the northeast have pendent cones, except the small-fruited cypresses and arborvitaes.

Only a few firs thrive well in the climate of northeastern America, but many prosper in the moister Pacific coast area. Abies concolor, White or Colorado Fir, is perhaps the best for the east, growing into a tall symmetrical specimen, handsome with its soft grayish or glaucous leaves. The smaller A. fraseri, Southern Balsam Fir or She-balsam, is native to the mountains of Virginia, West Virginia, and Tennessee; it is hardy in the north and is a better tree in cultivation than A. balsamea, the common Balsam Fir of the north.

The wood of several of the firs is of considerable value. It is odorless, from white to yellow or reddish-brown in color, coarse-grained and brittle, but soft and easy to work; it finishes with a smooth surface and takes paint well. It has many uses, being employed for the indoor finish of houses, the commoner kinds of carpentry, match wood, box boards, paper pulp, and wood wool. Its odorless character makes it an excellent wood for boxes for absorbent products, such as butter, cheese, lard, and bacon. The inner bark of the Southern Balsam Fir has been used medicinally as a stimulant, to treat intestinal worms, as an expectorant, and as a diuretic to increase urine flow. Cuts and wounds were also treated with a turpentine made from bark exudations. The Indians of British Columbia ate the inner bark of the Grand Fir in the spring when it was rich and juicy. The hardened sap of this and other firs was chewed as a gum and the juice swallowed for the nutrient contained; a healing resin was obtained from the bark blisters of young trees.

The importance of firs to wildlife is moderate. The evergreen foliage of young trees is useful to mammals and gamebirds for cover, especially in winter. Blue grouse and sharp-tailed grouse make fir needles a major part of their diet. Browsers, particularly northern deer and moose, resort to fir foliage as a large part of their winter menu. The winged seeds are sought by squirrels and chipmunks as well as being eaten from the cones by several kinds of birds. Firs planted around homes are particularly useful for roosting and nesting sites.

Key to Local Species of Abies

1. Leaves of sterile branches flat and grooved above, rounded and often notched, spreading, not crowded; winter buds nearly globose, with lustrous dark orange-green scales..... A. balsamea
1. Leaves of sterile branches 4-sided; winter buds ovoid, acute, their bright chestnut-brown scales with prominent midribs that project as short tips..... A. magnifica

Abies balsamea (L.) Mill. Balsam Fir.

Meaning of Species Name. Balsamic.

Other Names. Fir Balsam, Firtree, Fir Pine, Blister-pine, Silver Pine, Blisters, American Silver Fir, Single Spruce, Balm-of-Gilead, Balm-of-Gilead Fir, Fir, Balsam, Canada Balsam, Eastern Fir, Sapin.

Type of Plant. A slender tree, 40 to 60 ft high, with a trunk 12-18 in. in diameter; a low or prostrate shrub in exposed places.

Habitat. Moist woods and swamps.

Range. Nf and Lab to the Mack valley, s to NY, mts of Va and WVa, O, Mich, and Minn, with outlying colonies in Ia.

Distr in NYS. Common throughout the Adirondack reg, the n counties, and the higher Catskills; elsewhere locally abundant in deep swamps; not native on the coastal plain, the s range being the higher elevations of Dutchess, Ulster, Delaware, and Otsego co, westw to Onondaga, Ontario, and Livingston co.

Distr in the Torrey Range. NY: Greene, Delaware, and Ulster co; "Highlands of the Hudson" record unverified (since collected near Luddingtonville, Town of Kent, in Putnam co, 3428 KLB 26 Sep 54--NYS).

Elevation. Grows to 5000 ft in the Adirondacks; 1200-4100 ft in the Torrey range.

Time of Fl. May-Jun; May at Cornell.

Origin. Native.

Remarks. Wood soft, coarse-grained, weak, light brown; wt 24 lb per cu ft.

Of the two firs occurring in the eastern United States and Canada, the best known is the Balsam Fir. It is a widely branching but slender tree with fragrant resinous leaves; in arctic regions and at higher elevations it is small, often only a few feet high. It can be recognized by its two-ranked leaves, lustrous and dark green above, pale-lined below, one-half to one and one-half inches long, sometimes notched on twigs near the top of the tree. Rich, dark purple cones, 2 to 4 inches long, with thin, plain-margined, broad scales, stand erect, glistening with drops of balsam, on branches near the top of the tree. The same substance is exuded from bruises in the smooth bark.

The Balsam Fir is a common and characteristic tree of the north country; southward it occurs only along mountaintops or in cold swamps and bogs. The wood is light, coarse-grained, and soft; it is neither strong nor durable. It is occasionally utilized for lumber, but its principal uses are for making excelsior, boxes, and boards for packing cases, and, mixed with wood of the spruces, as pulpwood. Fire-by-friction sets have been made of this wood, and resinous fir knots were once used as torches. John Josselyn wrote that "the Knots of this tree and fat-pine are used by the English [colonists] instead of candles, and it will burn a long time, but it makes the people pale."

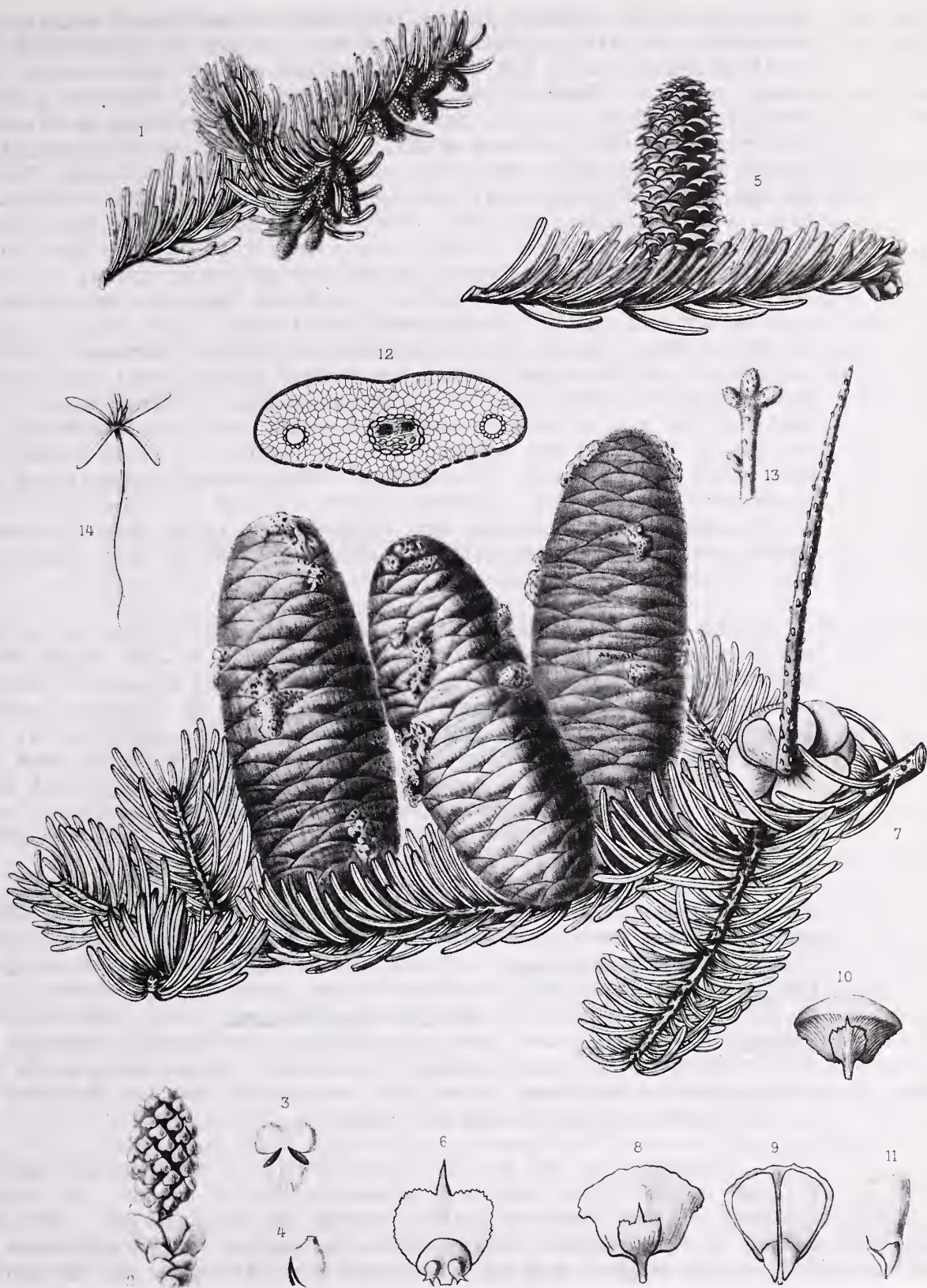
Although it is a hardy tree and in its youth a handsome one, Balsam Fir is not very desirable as an ornamental tree because it is short-lived and frequently loses all its lower branches. It is also quite difficult to grow outside its natural habitat. It is probably best known as the typical Christmas tree of the northeastern states, for as a Christmas tree

the Balsam Fir is superior to the spruces; it retains its fragrant and beautiful foliage for several weeks after the tree is cut; in addition, the needles do not stab the hand when one is decorating the tree, since they are not tipped with prickles. The Christmas tree industry is now a large, though a seasonal, business. Raising trees from seedlings supplied free or at cost by state forestry nurseries offers possibilities for making a good profit on land not otherwise productive.

The Canada balsam of commerce, also called Canada turpentine and balsam of fir, is derived from a resin in the blisters on the bark of standing trees, a turpentine used in the manufacture of varnish (among other things), the product coming principally from the fir forests of Canada. Sargent (1891-1902) has given us a clear picture of gathering Canada balsam in Quebec: "The gathering of Canada Balsam, which is chiefly a Canadian industry ... is carried on in the province of Quebec only by the poorest white people and by Indians, who camp in the woods from the middle of June until the middle of August, the season when it is usually gathered, the women cooking and keeping the camps, while the men and children gather the balsam. This is done with small iron cans, furnished at the top with iron tubes sharpened at the end. The tube is pressed against the resin blister, punctures it, and the gum flows down the tube into the can.... One man can gather about half a gallon of gum in a day, but with the assistance of his children, who climb into the upper limbs while the father works near the ground, the yield of a day's work for the family is often a gallon. Canada Balsam can be collected only on pleasant days when the leaves of the tree are dry, as the water shaken from the branches, mixing with the gum in the cans, makes it milky and unsalable."

Europeans were well aware of the medicinal properties of pitch, tar, gums, resins, and turpentine, most of which came from various species of pine, but in the popular mind they were very likely to confuse pine with spruce, fir, and larch. It is therefore not surprising that the early colonists took much interest in aboriginal uses of similar substances. John Josselyn in 1672 claimed that a tar made of the "Fir Tree, or Pitch Tree," was "an excellent thing to take away those desperate Stitches of the Sides which perpetually afflicteth those poor People that are stricken with the Plague of the Back.... You must make a large toast, or cake, slip or dip it in the tar, and bind it warm to the side." He also remarked that the "clear liquid Turpentine" obtained from this tree was "very good to be put into salves and ointments, the leaves, or cones boiled in beer are good for the Scurvie, the young buds are excellent to put into Epithemes for Warts and Corns, and rosen is altogether as good as frankincense." John D. Hunter in 1823 called "Indian Balsam" one of the most valuable articles among the aboriginal remedies and reported its use by frontier doctors, who spoke well of it. It was given for colds, coughs, asthma, and "consumptions," in substance or infusion, "with the most happy effects."

John Brickell, reporting in 1734 on the Indians of North Carolina, maintained that they "never make either Pitch, Tar, or Turpentine," and that "they are scarce ever known to make use of any Gums or Rosins in their Physick." (Balsam Fir was of course not common in that area, but other sources of pitch and turpentine were available.) This was surely



Abies balsamea--Balsam Fir
 [From Sargent (1891-1902), Vol. XII, Plate 610, p. 112.]

not true of the northern tribes, for they not only made medicinal use of the resin, but also employed the needles, twigs, and inner bark (which could be collected at any time during the year) of this species in a number of ways. Some tribes covered burns, sores, and cuts with the fresh liquid from bark blisters as a protective healing salve, while others applied the gum as a poultice on the chest or back to relieve pain in the heart or chest, and as an application for sore eyes. The gummy sap was also taken internally in infusion in the treatment of consumption, coughs, colds, gonorrhea, sore chest, as a remedy for constipation, and other internal afflictions. One tribe steeped the inner bark to make a tea given for pains in the chest and some tribes steeped balsam twigs for a strong laxative; others used the bark in a decoction to induce perspiration. The leaves were sometimes placed on live coals and the fumes were inhaled in the treatment of colds. Densmore (1928) reports that the Chippewas placed the gum of this species on a warm stone and inhaled the fumes to treat both headache and convulsions. They also combined the gum with bear's grease for use as a hair ointment. A decoction of the root was sprinkled on hot stones to steam rheumatic joints, especially of the knees, "the patient being covered closely and letting steam warm" the joints. Several tribes steeped the inner bark in boiling water, added tobacco leaves, and inhaled the rising steam to speed childbirth, but in all probability this did little other than stimulate the nasal passages.

In American medicine, the resinous exudation from the trunk and branches of A. balsamea was often called Canada balsam, which Dr. Clapp reported to be stimulant, diuretic, and possessed of properties similar to other liquid turpentine. Given internally, Dr. Wooster Beach asserted, Canada balsam was stimulating and laxative; externally, it was called emollient and cooling and useful for application to sore nipples, cuts, and wounds. It was also found useful in treating throat afflictions; in cough drops, it was considered "equal or superior to copaiba." "Balsam traumattick," used in wound dressings, was part of the medicine chest of the Lewis and Clark expedition.

Canada turpentine, Canada balsam, or balsam of fir are official pharmaceutical names for the substance defined as the liquid oleoresin obtained from A. balsamea. It was an official medicine in the U.S. Pharmacopeia, 1820-1916. Because of its index of refraction, however, it has been recognized in the U.S. Pharmacopeia since 1916 and in the National Formulary since 1926 primarily as a medium for mounting microscopic specimens and as a cement for lenses. It not only seals the cover glass to the glass slide, but as a matrix for the specimen holds and preserves it from drying and decay.

Woodsmen use the gum as a plaster and as a waterproof cement. The foliage is also often used in the manufacture of balsam, or so-called "pine pillows" sold to summer visitors touring the North Woods. Emerson (1878) stated that a valuable varnish for water colors can be made from the resin. In the woods the boughs are often used for beds, the branchlets for pillows.

Residents of the northern United States and Canada generally refer to the hardened pitch of this species as "spruce gum." It has a resinous

but not disagreeable flavor and was much used for chewing before the days of pleasantly flavored commercial chewing gums. In many places throughout its range it was regularly bought and sold at the stores. For chewing purposes, it was generally molded into short sticks. People used to make a regular business of going into forests of fir trees, gathering the gum and taking it to market. The inner bark, like that of the pines, spruces, and other conifers, can be used as an emergency food. The balsam or pitch, in extreme emergency, also forms a highly concentrated though disagreeable food.

Several species of birds, including ruffed, spruce, and sharp-tailed grouse, are known to eat the seeds of Balsam Fir, as do mice and red squirrels. White-tailed deer and moose frequently browse on the branchlets during the winter season, and the bark and branchlets are eaten to some extent both by the varying hare and the snowshoe hare. The bark is also gnawed by porcupines. Swamps where balsam thickets occur are favorite winter "yarding" grounds of deer.

Abies magnifica A. Murr. Red Fir.

Meaning of Species Name. Magnificent, distinguished.

Type of Plant. A tall tree, in its native habitat frequently 200 ft high with a trunk 7-10 ft in diameter.

Habitat. Mountain regions of the western states.

Range. S Ore, s along the Cascade mts and the Sierra Nevadas of Cal.

Distr in NYS. Not listed in House (1924).

Distr in the Torrey Range. Not listed in Taylor (1915).

Elevation. Grows between 5000-10,000 ft in its native range.

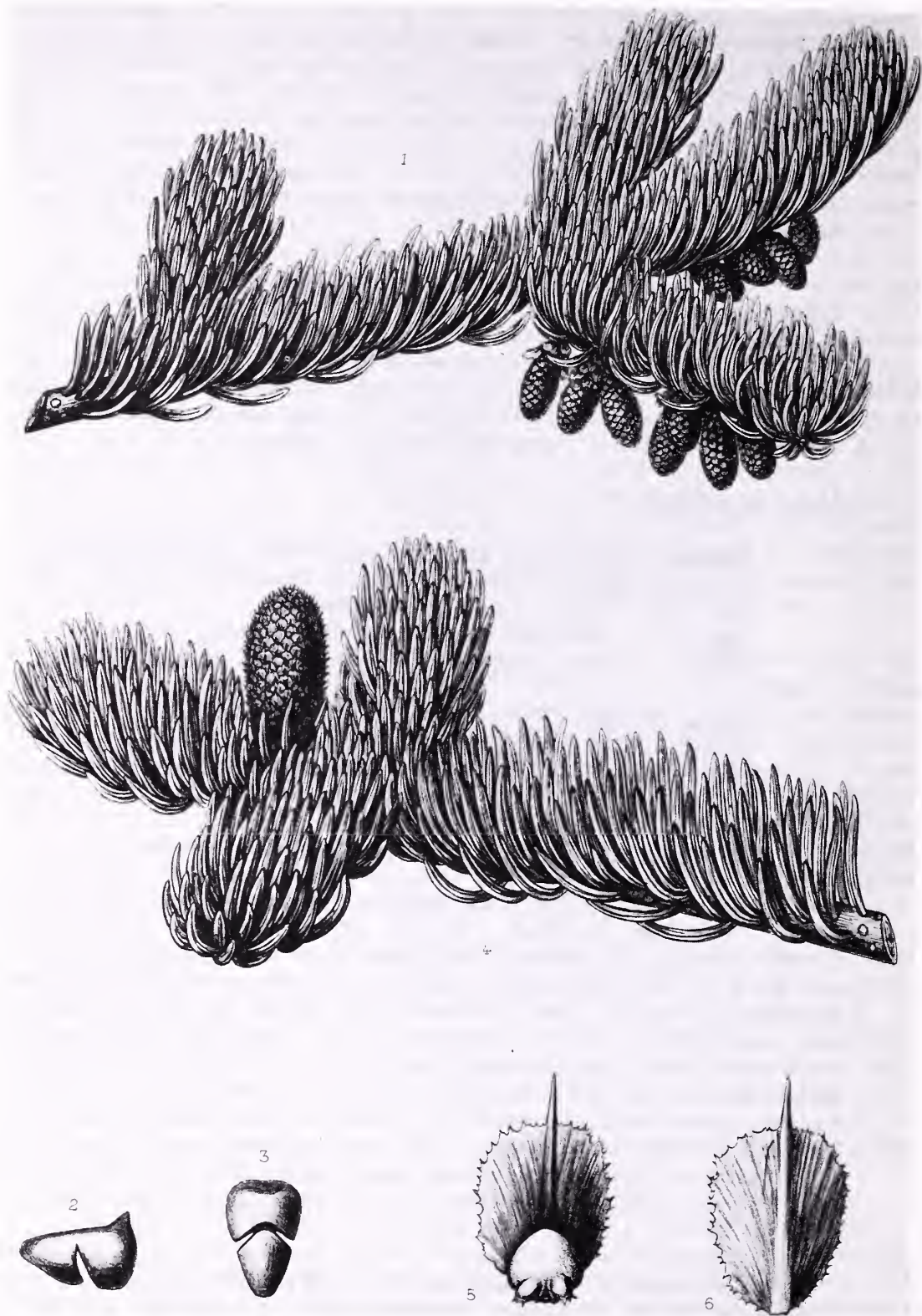
Time of Fl. Early summer.

Origin. Native to Ore and Cal.

Remarks. Esc from cult near Pine Hill, Ulster co.

John Muir called this species "the noblest of its race," its tall shaft, sometimes reaching a height of 250 feet, as described by Rogers (1926), having "a symmetry and perfection of finish throughout that is achieved by no other tree. One above another in graduated lengths the branches spread in level collars, the oldest drooping on the ground, the rest horizontal, their framework always five main branches that carry luxuriant flat plumes of silvery needles," for the four-sided needles are decorated on all sides with pale lines "so wide as to make the new growth silvery throughout the season." These leaves later become blue-green and persist for about 10 years. The cones appear in mid-June, the male ones in profuse bright-red clusters, the female, greenish-yellow tipped with pink. They ripen into cylindrical cones 6 to 8 inches long and about half as wide.

The wood of this species is light, soft, not strong, but comparatively durable. As Rogers remarks, "The best defense of this superb red fir is the comparative worthlessness of its soft, weak wood. Coarse lumber for cheap buildings, packing cases and fuel makes the only demands upon it." In European parks it is successfully grown as an ornamental tree, and it has proved hardy in eastern Massachusetts.



Abies magnifica--Red Fir
 [From Sargent (1891-1902), Vol. XII, Plate 618, p. 140.]

Larix Mill. Larch, Tamarack.

There are 10 species of Larix, all natives of the north temperate and arctic zones, widely distributed in central Europe, Asia, and North America. The most widely distributed of the four species of larch in North America is the American Larch, L. laricina, commonly called Tamarack but known also as Hackmatack. They are among the most beautiful of the deciduous trees in spring by reason of the delicate green of the young leaves and the beauty of the female cones, which are often pink. In autumn the plants are again very striking when the leaves turn pale golden-yellow before dropping. The name of the genus is the classical Latin name of the European species. Members of this genus are distinguished from the pines by their deciduous leaves, spirally arranged on the young shoots of the season, but on all older branchlets growing in whorls or rosette-like tufts, each surrounding the extremity of a rudimentary or abortive branch commonly called a spur. Larches are widely grown as timber trees, for the lumber is of good quality and variously used for building purposes. Being very durable in contact with soil and water, they also make excellent posts and have been widely used in the building of small boats.

The common European Larch, L. europaea, is a stately tree with a tall erect trunk and horizontal branches springing at irregular intervals from the trunk. A fine clear turpentine exudes in great abundance from the trunks of trees exposed to the summer sun. In Savoy and the south of Switzerland it is collected for sale, though not in such quantity as formerly, when, being taken to Venice for shipment, it became known in commerce as "Venice turpentine." Larch turpentine is a thick tenacious fluid, nearly transparent and of a deep yellow color, that does not harden with time. In addition to resin, it contains 15 percent of the essential oil of turpentine. The European Larch has long been planted in the eastern United States for ornament and, to a limited extent, for timber. The largest North American species is the Western Larch, L. occidentalis.

The record of wildlife use of larches is not impressive. Two species of grouse consume its needles and buds freely, and the red crossbill feeds on its seeds to some extent, as reported by Martin et al.

Larix laricina (DuRoi) K. Koch. Tamarack.

Meaning of Species Name. Like Pinus larix (Larix europaea), the European Larch.

Other Names. Larch, Black Larch, American Larch, Black Larix, Hackmatack, Hackmack, Red Larch, Juniper Cypress, "Juniper," Eastern Larch.

Type of Plant. A slender tree, usually not more than 50 ft high with a trunk diameter of 1 or 2 ft.

Habitat. With us, chiefly in swamps, bogs, and swampy woods.

Range. Lab to Ak, s to NJ, Pa, WVa, O, Ill, Ind, Minn, Man, Sask, Alta, and BC.

Distr in NYS. Common in swamps throughout the n part of the state, common or frequent in the c and w counties (especially on

calcareous soils), rare in the Hudson valley, and not reported from SI but reported as formerly found at Wading River, LI.

Distr in the Torrey Range. NY: Throughout except in the lower Hudson valley, LI, and SI, increasing northw.

Elevation. Sea level-1933 ft in the Torrey range.

Time of Fl. Mar-May; May 1-15 at Cornell.

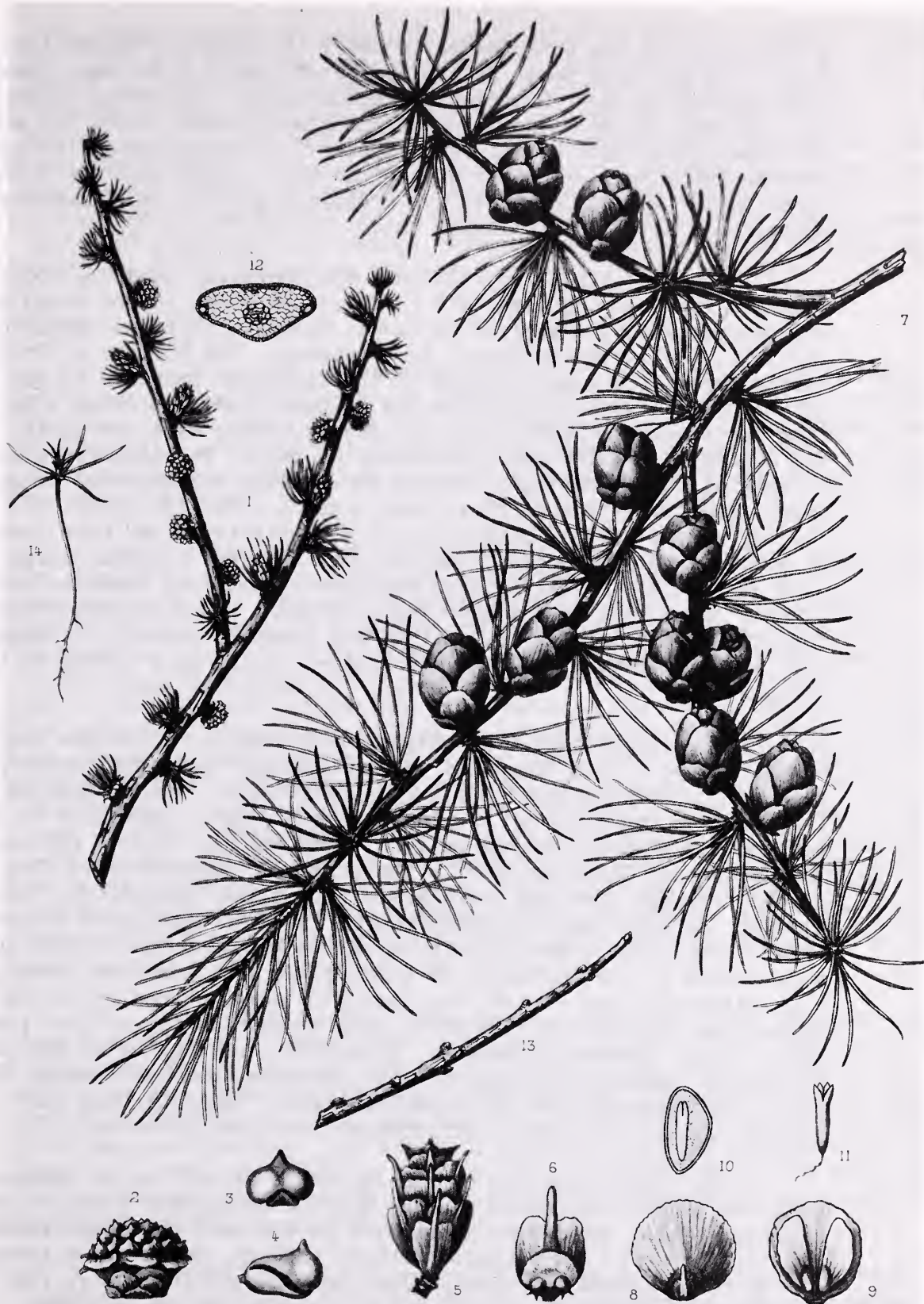
Origin. Native.

Remarks. Wood hard, strong, very durable, resinous, light brown; wt 39 lb per cu ft.

This is a typical northern tree, reaching the northern limit of tree growth in Canada; it is the most widely distributed larch in North America, growing farther north than any other tree except dwarf willows and birches. In early spring its pale green needles make it one of the most beautiful of all native trees, but in winter one writer has described it as "the deadest-looking vegetation on the globe." Its wood, however, is much appreciated over vast areas where other timber is wanting. When spring comes, the cones are followed in a few weeks by the renewing foliage, for the larches are the only conifers native in North America (except the Bald Cypress of the south) which are deciduous. It is the largest tree of Labrador, but it reaches its greatest size north of Lake Winnipeg, where it may attain a height of 60 feet and a trunk diameter up to 2 feet. In the far north, growth is extremely slow, but in favorable situations the tree grows rather rapidly in its youth. It is intolerant of shade, however, and is very likely to be suppressed in competition with other trees. It resembles the European Larch but has much smaller cones.

Long before white men came to North America, the Indians used the roots of Tamarack for sewing the strips of birch bark in their canoes and for weaving bags. The best roots came from trees in beaver ponds, for they were especially tough, pliant, slender, and elongated. For this purpose they were treated as described under spruce (below). As for its use by the early settlers and following generations, Emerson (1878) well describes the esteem in which the native Larch was held a century ago: "The wood of the larch is very compact and close-grained, remarkable for its weight, its great strength, and durability.... Its durability is even superior to the oak itself; and in old vessels, the timbers made of hackmatack have been found entirely sound, when those of white oak were completely decayed. On these accounts, it is preferred before all other woods, for knees, for beams, and for top timbers [in the construction of ships].... Its great hardness makes it valuable for steps in exposed situations; and its great compactness gives it great power of resisting the action of fire, and renders it nearly incombustible, except when splintered." Because of its durability Tamarack is still used by builders of small boats, and, in the days before creosoting rendered almost any hard wood suitable, it was considered ideal for railroad ties and for telegraph poles. It has also been used, to a lesser extent, for interior finish and in cabinet making.

This tree is seldom used for ornamental planting, although it is quite attractive and adapted to grow in soils which are ordinarily too wet for most other trees. When grown as an ornamental, some pruning may



Larix laricina--Tamarack
 [From Sargent (1891-1902), Vol XII, Plate 593, p. 10.]

be necessary in the early years in order to develop a single leading stem. The American Larch is too sparse of limb and foliage, however, to compete with the more luxuriant European Larch. Its fresh spring foliage is lightened by the pale yellow of the globular male cones and warmed by the rose-purple tips of the female cones. In early autumn the plain, thin-scaled cones, erect and bright chestnut-brown, shed their small seeds while the yellow leaves are dropping, and the bare limbs carry the empty cones until the following year.

Densmore (1928) reported that the Chippewas used the roots of the Tamarack for "weaving bags, etc." The inner bark, either fresh or dried, was chopped fine and applied to burns; it was applied in the morning, partially washed off at night, then renewed. The Indians of British Columbia chewed the gummy exudate of the trunk and branches of the Western Larch for pleasure. Aside from the Ojibwa tribe, who drank a tea made from the roots of American Larch, however, there were few Indian groups who relied on the larches as a source of food. The inner bark no doubt is edible, for in northern Siberia the natives are reported to grate this layer from the native larch to make a broth with fish, meal, and milk. The new shoots of the American Larch are nutritious and have been eaten by woodsmen in emergencies. On the Continent the European Larch has been used as a source of dye, a musk color being obtained from the leafy shoots, brown from leaves gathered in autumn, and a yellowish-cinnamon from the shoots without leaves, using a bismuth mordant. It might be well worth experimenting with our native species as a source of dye materials.

It may have been the Indians who showed the first New Englanders hidden virtue in the Tamarack. John Josselyn, first naturalist-historian of the Massachusetts Bay Colony, recorded: "The Turpentine that issueth from the cones of the Larch-tree ... is singularly good to heal wounds, and to draw out the malice ... of any Ach rubbing the place therewith, and Strowing upon it the powder of Sage-leaves." The gum that exudes from the tree has been chewed to relieve indigestion, and a poultice of the bark was considered useful in the treatment of bruises, wounds, and hemorrhages. The bark of the European species was long used medicinally on the Continent in a decoction as a laxative, tonic, astringent, diuretic, and alterative, useful in obstructions of the liver, rheumatism, bronchitis, jaundice, afflications of the urinary passages, and in some cutaneous diseases. A decoction of the leaves was also used for piles, haemoptysis, menorrhagia, diarrhea, and dysentery. The dosage was 2 tablespoonsful of the bark decoction. Tamarack bark also contains tannin, which can be extracted and used in tanning leather.

The seeds are eaten by red squirrels as well as by several kinds of birds, including ruffed grouse, and the branchlets sometimes are browsed by deer. Also, the leaves contribute to the diet of sharp-tailed grouse, the varying hare, and snowshoe rabbits. Seeds, needles, or inner bark are eaten by ruffed and sharp-tailed grouse, snowshoe hare, red squirrel, porcupine, and deer.

Sight records of *Larix laricina* in the Catskills in most instances probably actually refer to one or more hybrids, much used by state and

other agencies for reforestation purposes. The only collection of Larix bearing cones (the one positive means of identification) made by the writer was determined by Stanley J. Smith to be L. x pendula Salisb. All records of Larix are plotted under L. laricina on the distribution map in the Appendix, but more careful study is necessary to determine what taxa are actually represented in that area. L. decidua Mill., the European Larch, sometimes spreads from plantings in uplands and is to be looked for in the Catskills; it has cones 20 to 35 mm long, and puberulent, not glabrous, cone scales. The cones of the Tamarack, on the other hand, are 15 to 20 mm long and the cone scales are glabrous.

Picea A. Dietr. Spruce.

This is a genus of some 40 species of the north temperate zone, most numerous in Asia; in North America there are seven native species. The name of the genus is derived from the Latin pix, pitch, and refers to the resin or pitch obtained from the common European species. Several species are commonly cultivated as ornamentals, especially P. abies, the Norway Spruce.

The spruces have been confused with the firs, and the names of the two genera have been badly mixed, but careful examination of the shoots and cones reveals a number of distinguishing features. The 4-sided, needle-shaped leaves of Picea are somewhat spirally arranged on the branchlets, while the flat leaves of the firs appear to be 2-ranked (the exotic Abies magnifica has 4-sided needles, but only one station is known for it in the Catskill region). In addition, the leaves of the spruces are raised on peglike pulvini. When a leaf falls from the shoot of Picea, this small peglike base is left on the stem, which gives the bark a roughened character almost like a nutmeg grater; but when the leaves fall from Abies, no such peg is left--there is simply a disklike scar. Moreover, the base of the leafstalk of Abies is slightly swollen, but no such swelling occurs in Picea. Also, in Picea the cones are pendulous from the branches, except when very young, and they remain intact on the branches for several months after the seeds are ripe. In Abies the cones are erect on the branches and they break up as soon as the seeds are ripe, leaving only a central core on the shoot.

P. orientalis, the Oriental Spruce, a native of the Caucasus and Asia Minor, forms a large tree over 100 feet high. It is superior to P. abies as a decorative tree but is not hardy so far north, although it will grow in central New England. The Blue or Colorado Spruce, P. pungens, native to the central Rocky Mountain region, is one of the most distinctive American species. Its stiff, horizontal branches and rigid bluish-green to silver-white leaves make it one of the most beautiful evergreens for the garden. Several varieties with characteristically blue foliage are widely grown for ornament.

The inner bark of the spruces has been used in spring and early summer as an emergency food, for the Indians of Canada and the northern United States ate the inner bark of the spruces as they did that of the pines. Some tribes sucked on the small cones as a treat, but the Crees used them medicinally, eating them to relieve the discomfort of sore

throat. The young shoots, stripped of their short needles, have also served as food in emergencies. Most species of spruce were so used, but the Black Spruce, as reported by Weiner (1972), was used to save an early crew of explorers from scurvy; they boiled the bright green needles and drank the decoction. Spruce gum is derived from the two black spruces, P. rubens and P. mariana, for when of the proper hardness, the resinous exudations from bark wounds are the woodman's chosen chewing gum. The young shoots of these two spruces were also important ingredients in the formerly popular and still locally made spruce beer.

Spruces produce less commercial timber than pines, but in contrast they have furnished much pulpwood for newsprint and other purposes. The lumber of spruces is easily worked and much used in carpentry. That of the Sitka Spruce is perhaps best of all, and, although light, it is strong in comparison to its weight. Resonant properties of the wood make it particularly useful in the manufacture of violins and other musical instruments. Burgundy pitch is the purified resin extracted from P. abies, and the bark of various species contains tannin. Although often sold for Christmas trees, spruces have the disadvantage of rapidly losing their leaves when brought into the house.

Although both seeds and needles of various species of spruce are eaten by small mammals and several kinds of birds, Martin et al (1961) remark that the wildlife value of spruces is largely confined to northern animals. Several kinds of grouse obtain much of their food from spruce needles. The foliage and twigs are browsed extensively by rabbits and deer in winter, and the small winged seeds are a valuable food of the white-winged crossbill and several other kinds of birds, as well as being eaten by squirrels and chipmunks. When planted about residences, spruces provide excellent nesting and roosting sites as well as winter cover for birds.

Key to Local Species of Picea

1. Cones 1-1.5 dm long (branches subglabrous, leaves slender, sharp-pointed, dark green, glossy)..... P. abies
1. Cones much smaller, rarely exceeding 0.5 dm in length, 2
 2. Branchlets glabrous; bark pale brown; cones nearly cylindrical, becoming pale brown; buds glabrous..... P. glauca
 2. Branchlets pubescent; bark reddish- to blackish-brown; cones ovoid to subglobose, reddish-brown, buds pubescent, 3
 3. Leaves more or less glaucous, bluish-green, mostly 6-10 mm long; cones ovoid to subglobose, dark purple before maturity, grayish-brown when ripe, usually 2-3 cm long, remaining for some years..... P. mariana
 3. Leaves not glaucous, green, mostly 12-15 mm long; cones short-oblong, green or purplish green before maturity, brown when ripe, usually 3-4 cm long, falling in one year..... P. rubens

Picea abies (L.) Karst. Norway Spruce.

Meaning of Species Name. The Latin name of a European species of fir.

Habitat. Occasionally spreading from plantings, on uplands.

Distr in NYS. Not reported by House (1924) as a naturalized species.

Distr in the Torrey Range. Reported as an estab esc.

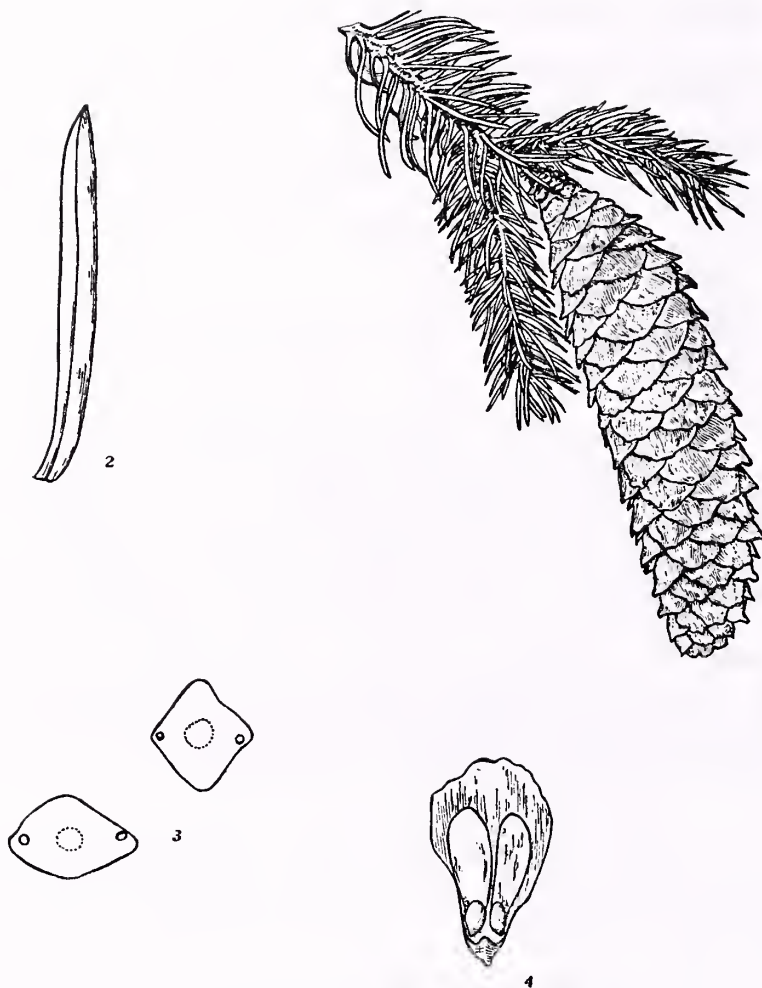
Time of Fl. May-Jun.

Origin. Native of Eu.

Remarks. Often planted as a shade tree; frequently spreads northw from planted trees. Also used extensively in forest planting.

From an economic standpoint the most valuable species of spruce in Europe is no doubt the Norway Spruce. It is native to northern and central Europe and Asia, where it occurs up to an altitude of 6000 feet, almost the limit of tree growth in northerly regions. In favorable situations it becomes the tallest and one of the stateliest of European trees, sometimes rising to a height of 170 feet and attaining a trunk diameter of 5 to 6 feet at the base. On the Swiss Alps it is one of the most prevalent and striking of forest trees, and in the lower districts of Sweden it is the predominant tree in most of the great forests. In Norway it constitutes a considerable portion of the dense woods of the southern valleys, flourishing on mountain slopes and clothing the shores of some of the fjords to the water's edge.

While less valuable than pine, the Norway Spruce is an important timber tree. When grown in close stands, the white wood has a compact and even grain suitable for a great variety of uses. Of this species Michaux (1851) wrote: "The wood is essentially different from that of the Wild Pine [Pinus sylvestris], being whiter, far less impregnated with resin, and consequently lighter, to which is added greater elasticity. The union of these qualities renders it peculiarly proper for the yards of large ships. Besides this important use, it is much employed in England in joinery ... It is brought principally from Norway, and forms a large proportion of the commerce of that country in wood, which exceeds a million and a half dollars annually. In the north of Europe its bark is frequently substituted for that of Oak in tanning." Great Britain also imported great quantities of younger trees as poles, used for scaffolding, ladders, and mining timber. In Norway the wood is very extensively made into wood pulp by hydroelectric power. It is also grown as a "nurse" tree for other trees, cover for game, and for small stakes and poles. It bears the smoke of cities better than most of the fir group, although it is subject to blight, which gives it an unhealthy appearance after a certain age. In North America the Norway Spruce was introduced rather early as an ornamental tree and is the commonest species in cultivation in the Catskills, where large specimens are often seen about old farmsteads. In some areas it has also been extensively planted for windbreaks, hedges, and shelterbelts, where its long lower branches rest on the ground and the upper limbs shingle over the lower ones, forming a thick leafy shelter against drifting snow and winds. In more recent years it has likewise been much cultivated for Christmas trees, and large numbers of Norway Spruce seedlings are now also being used for reforestation purposes.



Picea abies--Norway Spruce
[From Burns & Otis (1916), p. 44.]

As a decorative tree it may be surpassed in beauty by some of the rarer kinds, but this is one of the most generally useful of spruces. It grows well on a wide variety of soils and adapts itself to various climatic conditions. It grows rapidly, and, particularly in its youth, it is very attractive, forming a broadly conical and dense crown with branches persisting nearly to the ground. There are a number of varieties of distinct habit, the dwarf kinds being very useful for planting in rock gardens and in foundation plantings, some of which make a dense, compact bush of very slow growth. There are also varieties with colored leaves.

Though designated as the source of Burgundy pitch, it furnishes but a part of the substance sold under that name by druggists. Tingley asserts that the real Burgundy pitch is obtained from *Abies picea*, the European Silver Fir tree. According to Geiger, who is probably correct, it is procured from both species. From various species of "pine" in different parts of Europe, a similar product is obtained and sold by the same name. Applied to the skin in the shape of a plaster, Burgundy pitch acts as a gentle rubefacient, producing a slight inflammation and serious effusion without separating the cuticle. It is used chiefly in the treatment of

rheumatic pains and in chronic affections of the chest or abdomen. In northern Europe sprays of Norway Spruce are used in making beer.

In Lapland a camel-hair color for wool or cotton is obtained from the twigs of this species. Twigs free from lichens are gathered and chopped into small pieces, then simmered for 12 hours in an aluminum or enamel kettle. The yarn is then immersed in the dye bath and held at a temperature of 176° F, stirring occasionally to obtain an even color. Different shades result, depending on the time the yarn is kept in the dye bath. When the desired shade is obtained, the wool is hung up to dry without rinsing.

Picea glauca (Moench.) Voss. White Spruce.

Meaning of Species Name. Blue-green, from the foliage.

Other Names. Cat Spruce, Skunk Spruce, Canada Spruce, Single Spruce.

Type of Plant. A handsome tree growing from 75 to 135 ft high, somewhat resembling Balsam Fir in aspect; dwarf and depressed in alpine and exposed habitats.

Habitat. Woods, usually in rich moist soils.

Range. Lab to Ak, s to n NE, ne NY, n Mich, Wis, Minn, SD, and Wyo.

Distr in NYS. Common or frequent in the northern counties; a rare tree s of the Adirondacks.

Distr in the Torrey Range. Reported as an estab esc.

Elevation. Collected at 1400 ft in Delaware co.

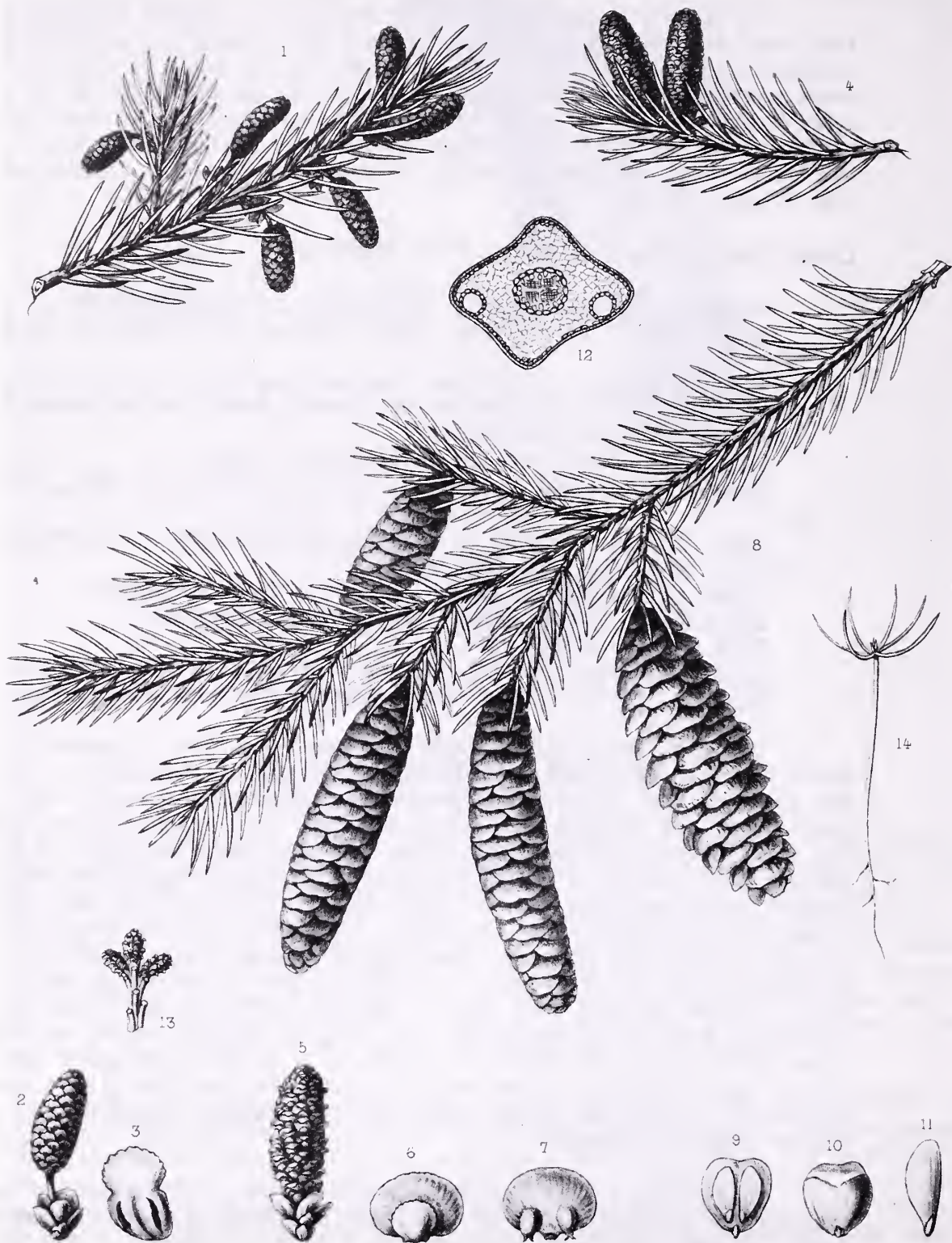
Time of Fl. May-Jun.

Origin. Native in n NY; spread from cult in the Catskills.

Remarks. Often an important component of northern forests.

Peattie (1950) states that "The most beautiful approach to the North American continent from Europe is up the St. Lawrence to Quebec," the white cliffs of the Gaspé peninsula contrasting sharply with the vast coniferous forests of so dark a green as to appear almost black. "In this forest," he continues, "are set the little villages of French Canada, the inevitable white steeple and gold cross gleaming bright against the evergreens and the raw, elemental blue of the sky. Each of these villages seems, from the deck of the ship, a collection of toy houses and churches pressed closely by Christmas trees. And of all the Conifers there, the fairest is the White Spruce, the beauty of its family." It was in this very setting that White Spruce was first seen by Europeans when in the autumn of 1535 Jacques Cartier sailed up the Saguenay river, where he "found as beautiful a country and lands and views as one could wish for, level as aforementioned, and the finest trees in the world," including "Oaks, elms, walnuts, cedars, spruces, ash trees, willows and wild vines."

White Spruce is a decidedly northern tree, attaining its largest size on the eastern slopes of the Canadian Rockies, where it sometimes grows 150 feet high with a trunk 3 to 4 feet in diameter. The bruised shoots and foliage have a strongly disagreeable odor, whence the local names Skunk Spruce or Cat Spruce, but not all trees have this ill-scented



Picea glauca--White Spruce
 [From Sargent (1891-1902), Vol. XII, Plate 597, p. 40.]

odor. This northern species prevails throughout Canada to the very limit of tree growth; it barely enters the United States along the northern border, but it is sometimes planted as an ornamental tree and is occasionally used for reforestation purposes in the northern parts of the United States. It is a handsome, long-lived tree of imposing appearance and thrives on a variety of soils. It is excellent for use as a windbreak and can be sheared to form a good hedge, but it cannot be expected to grow well south of New York City. In former times the Indians used the pliable roots for lacing their birch bark canoes and in making various artifacts. The long slender roots of this and other spruces were gathered, coiled, and placed for about an hour in hot wood ashes to steam. They were then removed, split, and soaked in hot water just before using.

In the western provinces of Canada this species often becomes a fine timber tree, much used for interior finish. Its wood is usually not separated from that of Red Spruce in statistics of the lumber trade, however, and it is used for the same purposes. Its greatest use is in the making of paper pulp, particularly in eastern Canada, where it is the chief species utilized in the wood-pulp industry. Pulp manufacture requires an abundant tree with soft fibers, qualities for which White Spruce is unsurpassed, in addition to which it is a fast-growing tree. Many newspapers in the United States own their own spruce forests in Canada with the hope that by operating on successive tracts over a large area they can be assured of a continuous supply. As Peattie (1950) observes, "To produce a ton of newsprint requires one cord of wood, 2800 tons of water, nearly 2000 kilowatt hours of electrical energy or 100 horsepower for twenty-four hours, and a capital up to \$50,000 per ton of daily output."

Picea mariana (Mill.) BSP. Black Spruce.

Meaning of Species Name. Of Maryland, the name originally used by Miller as synonymous with North America.

Other Names. Bog Spruce, Bay Spruce, Eastern Spruce, Yew Pine, Spruce Pine, He-balsam, Spruce Gum-tree, "Juniper," Blue Spruce, Double Spruce, White Spruce, Cat Spruce, Swamp Spruce, Water Spruce, Lash-horn, Shortleaf Black Spruce, Shortleaf Spruce, Spruce.

Type of Plant. With us, chiefly a small tree 15 to 30 ft high with a trunk diameter of 6-10 in.

Habitat. In our area usually on cool slopes, in swamps, bogs, and on mountain summits; northw also on drier soils.

Range. Lab to Ak, s to NJ, Pa, Va, WVa, Mich, Wis, Minn, Man, Sask, Alta, and BC.

Distr in NYS. Common in the n part of the state and in bogs throughout the c counties; less frequent or rare in the s tier of counties and in the w part of the state; reported southw to Dutchess, Sullivan, and Delaware co.

Distr in the Torrey Range. NY: Greene, Delaware, and Ulster co.

Elevation. 740-2400 ft in the Torrey range.

Time of Fl. May at Cornell.

Origin. Native.

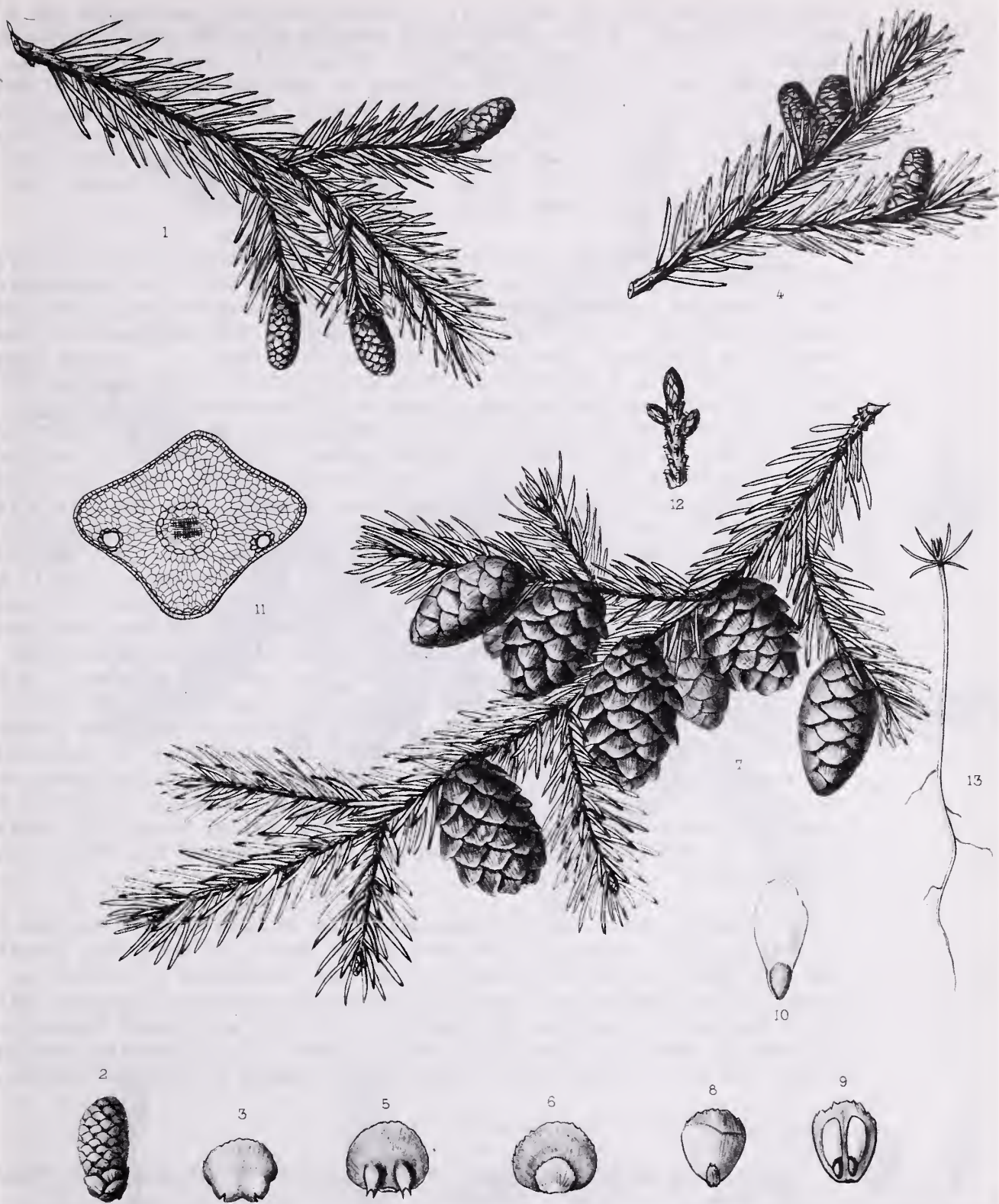
Remarks. Wood soft, weak, pale red or nearly white; wt 28 lb per cu ft. Picea rubens has longer needles and cones and occurs mostly on uplands, while P. mariana grows primarily in bogs and on wet soil.

The Black Spruce is a northern tree, extending to the very limit of tree growth in Canada. In the far north it occurs on barren and stony slopes, but it makes its best growth on well-drained bottomlands, where it often reaches a height of 100 feet. Southward it grows (along with Tamarack) almost exclusively in swamps and bogs, where it is slow-growing and attains a height of only 15 to 30 feet. It is therefore often referred to as Swamp Spruce or Bog Spruce. In bogs the lower branches often become embedded in sphagnum moss, take root, and in time become erect, so that they look like separate trees, a process known as layering. Here growth is so slow that trees only a few feet high are found to be 20 to 40 years old and often bear cones profusely--a sign of maturity. It is a ragged, "unkempt," dingy tree, with short drooping branches, downy twigs, and stiff dark blue-green foliage, scarcely half an inch long. The cones of the Black Spruce, smallest in size of all the native spruces, are about an inch long and remain attached to the branches for years.

This is not a good ornamental species, since it grows slowly and is of untidy appearance. Throughout most of the southern part of its range, therefore, this scraggly, undersized spruce is ignored both by horticulturists and lumbermen. But in the north it is cut for pulpwood, as the soft, weak, yellow wood, converted into paper, needs very little bleaching. In earlier days, however, this spruce was considered one of our most valuable timbers, as Emerson (1878) noted: "The valuable properties of the wood of double spruce are strength, lightness, elasticity, and durability. As combining these in a higher degree than any other wood applicable to the purpose, it is used for the smaller spars of ships,--for all, indeed, except the masts and bowsprits,--in preference to any other except the white or single spruce, and in toughness it is superior to that. It is also sometimes used, in place of oak, or mingled with it, in the upper part of the hull, and is found to outlast the oak, and to possess the requisite tenacity.... Knees, also, of great durability, are made of the lower part of the trunk and a principal root of the spruce. It is much used for making ladders, and extensively employed in building, being suitable for the smaller timbers in the frames, and for shingles." Less than a quarter of a century later, however, Sargent (1891-1902) stated that "It is probably never used, except in Manitoba and Saskatchewan, for other purposes than the manufacture of paper pulp."

In his Medical Flora, published in 1828-30, Rafinesque reported of this and other American spruces that "The bark of spruce trees is sudorific, and in extensive use for tanning leather, also to dye of a brick-red color. The inner bark is used by empirics, in powder and tea, for bowel and stomach complaints, rheumatism, and gravel.... The resin exuding from the trees is nearly like frankincense. Josselin [*sic*] says that it is very good in powder over wounds to reproduce the flesh."

One of the most famous of all Indian "cures" took place in 1535 when the French explorer Jacques Cartier lost 25 of his men to scurvy after his party became icebound in the St. Lawrence river near the site of modern Montreal and the rest were so sick that they thought they "should never recover againe, only three or four excepted." One of the Indians of that region then gathered the branches of "a certain Tree"



Picea mariana--Black Spruce
 [From Sargent (1891-1902), Vol. XII, Plate 596, p. 32.]

and showed the men how to use it, "boiling the bark and leaves for a decoction." There is some doubt as to exactly what tree was used to cure the men in six days; some authorities think that it was either White Pine or Eastern Hemlock (both of which grow in that area and either of which would have been an effective remedy), but, in his work on American medicinal plants, Dr. Millspaugh (1887) lists this species as the antiscorbutic tree and was positive that "The discoverers of Canada were cured of scurvy by it, since which it has become in common use in Canada, the Northern States, and even in Europe."

It has sometimes been asserted that the Indians of North America had no knowledge of alcohol, but Sargent remarks that "The preparation of a fermented beverage made by boiling spruce branches with honey was probably familiar to the northern Indians before the settlement of the country by Europeans, who learned the art from them ..." In any case, "spruce beer" was a favorite drink in the North Woods during the 1800's, one which even now has not quite gone out of fashion. In The Maine Woods, Thoreau reported that "Instead of water we got here a draft of beer, which, it was allowed, would be better; clear and thin, but strong and stringent as the cedar-sap." The Indians made it simply by boiling spruce twigs and young cones in maple syrup, which they drank as a refreshing year-round drink, rich in vitamin C. In time, however, the white man developed more sophisticated procedures, as Sargent reports: "Spruce beer, which is considered a pleasant and agreeable drink in hot weather, and a useful preventive of scurvy, is now made from the essence of spruce ... obtained by boiling the young branches of the Black and Red Spruces in water and evaporating the decoction, the disagreeable odor of the White Spruce making it unsuitable for this purpose. To prepare this beverage the essence of spruce is boiled in water flavored with various ingredients [Emerson (1878) suggests roasted oats or barley and toasted bread or biscuits, sweetened with brown sugar or molasses, and fermenting by means of yeast], and is then mixed with molasses or occasionally with sugar, allowed to ferment, and bottled." "Proper spruce beer" was considered "a palatable and healthy drink, powerfully antiscorbutic." It was even carried by Captain Cook on one of his voyages to prevent scurvy.

"Spruce gum," the resinous exudation of both the Red and the Black Spruce, is still sometimes gathered in the north and used as a chewing gum, but gone are the days when the gum was "collected in winter by 'gummers,' men on snow-shoes, carrying long poles armed with chisels, with which the resinous masses are knocked or cut off and caught in small cups attached to the poles just below the chisels." This favorite chewing-gum of the old lumber camps has largely been replaced by tropical chicle.

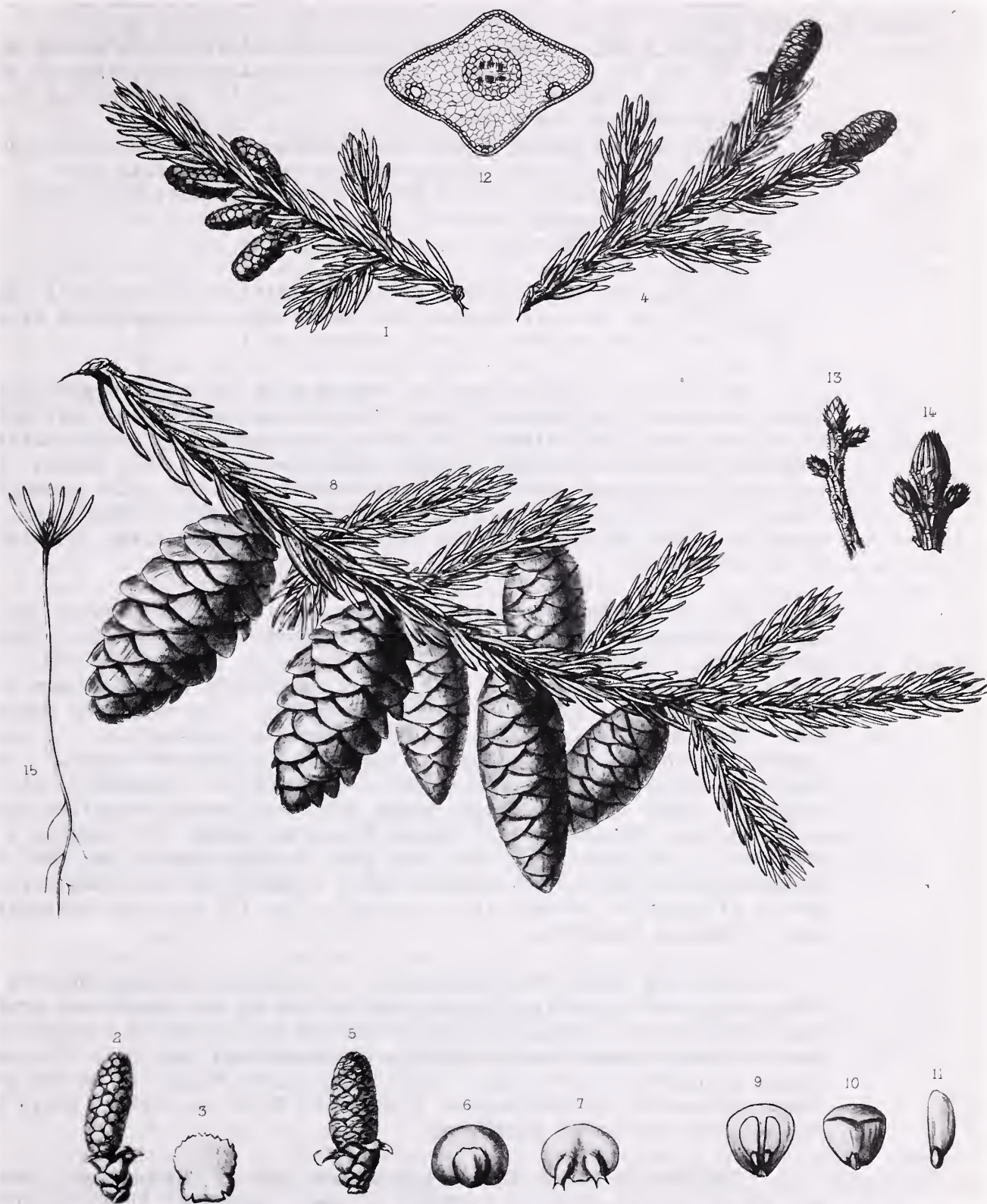
Picea rubens Sarg. Red Spruce.

Meaning of Species Name. Reddish, from the color of the twigs and bark.

Other Names. He-balsam, Yellow Spruce.

Type of Plant. A slender tree, 50-80 ft high with a trunk diameter of 1 to 2 or 3 ft.

Habitat. Rocky woods and hillsides, especially in the mts.



Picea rubens--Red Spruce
 [From Sargent (1891-1902), Vol. XII, Plate 597, p. 36.]

Range. Que and Ont to Pa and NJ, s along the higher mts to NC and Tenn.

Distr in NYS. Common throughout n NY and locally abundant southw to c NY and the Catskill mts, elsewhere local or rare; rare or absent s of the Hudson highlands and on SI and LI; not reported from the w counties of the state.

Distr in the Torrey Range. NY: Throughout except s of the Hudson highlands and on SI, increasing northw; rare at Orient, LI.

Elevation. Grows to 4500 ft in the Adirondacks; sea level-2100 ft in the Torrey range.

Time of Fl. May-Jun.

Origin. Native.

Remarks. A valued timber tree; wood similar to that of P. mariana, which has shorter needles and cones and occurs on moist sites, while this species grows on well-drained soils.

Red Spruce is often seen in company with Balsam Fir, particularly in the southern Appalachians, where the mountain people not only call both spruce and fir "balsam," but refer to a certain type of mountain as a balsam--meaning one conspicuously crowned with these two trees. Their very dark, evergreen summits contrast sharply with the paler green deciduous trees of the forest zone below them. The "Black Mountains," culminating in Mt. Mitchell itself, take their name from these blackish caps of spruce and fir.

So closely are these two trees associated in the minds of the southern mountain people that they are respectively called He-balsam and She-balsam. "Observing that the Fir has swollen blisters of resin under the bark," remarks Peattie (1950), "they fancifully compared them to breasts filled with milk; hence the She-balsam. And supposing perhaps that a mate must be found for the She-balsam and noting that its companion tree had no resin blisters, they named it the He-balsam." In truth, however, the mountain people could not fail to observe that when the lower limbs of this species break off, they leave projecting appendages, whereas the branches of Balsam Fir often break off, leaving a depression in the bark. "He" can easily be distinguished from "She" by the characteristic odor of the needles; when crushed, those of the spruce have a distinctive orange-rind aroma, while the fir has the characteristic odor of balsam pillows.

Like the Balsam Fir, Red Spruce is typically a Canadian zone tree, occurring southward only at higher elevations in the mountains, preferring cold, moist situations on well-drained soils, but it frequently occurs along streams, on the borders of swamps and bogs, and in mixed stands of northern hardwoods, Hemlock, and White Pine. It is the most common spruce in the Adirondack, Green, and White mountains, where it may take two centuries to mature.

Indians of the northern regions made use of the needles, roots, and gum of this species in a number of ways. Densmore (1928) reports that the Chippewas used the fresh leaves of Red Spruce to make a beverage, while the long slender roots were employed in sewing canoes and other articles made from birch bark. The gum was used to make a pitch

for caulking canoes and birch-bark pails. It was prepared by boiling the gum in a wide-meshed bag, which retained the bits of wood and bark, permitting the gum to pass through into the water. The gum was then skimmed from the surface and stored until needed, when it was mixed with charcoal made from juniper.

In former days this was one of the important forest trees of the northeast, for the straight trunks with sound knots develop an elastic wood that is strong in proportion to its weight; but lumbermen ignored it until the northeastern forests had been denuded of their valuable stands of White Pine and softwood lumber was becoming increasingly difficult to find. Between then and now, however, most of the merchantable spruce has been heavily cut, and in the southern Appalachians, at least, spruce-fir forests do not readily replace themselves; brambles, oaks, pin cherry, and Trembling Aspen move in instead.

Wood of the Red Spruce has a long list of uses, an enumeration of which would almost duplicate those for White Pine, but it has one distinctive quality not shared with pine, and that is its resonance. Musical resonance in wood is superior to that of metal by reason of the fact that wood not only enriches and softens the tone but also damps it off quickly. There is therefore no substitute for spruce in the manufacture of guitars, mandolins, organ pipes, piano sounding boards, and violin bellies. Among its other uses may be noted the making of boxes and crates and its usefulness as construction lumber. In addition, food containers made from it do not impart an unpleasant taste to the contents. In former days not only were the tall, straight trunks utilized as masts, but the crooked roots supplied "knees" used in ship and boat construction. Red Spruce has also been employed as pulpwood, and smaller trees are often used as Christmas trees.

The pitch, as available, has been used medicinally, particularly in the southern Appalachians, having been applied to rheumatic joints and to the chest or stomach to allay pains and discomfort. In the spring of the year the tender young growth was often used to make spruce beer, a remedy for scurvy in earlier days. It was simply made by boiling the young twigs, together with their leaves, then adding yeast and molasses, honey, or maple sugar, after which the mixture was allowed to ferment.

Except in Pennsylvania and Virginia, this species is not common in cultivation, as it demands a cool, moist climate and seldom succeeds out of its natural habitat. In areas where it will grow, however, it is more deserving of cultivation than P. mariana, for it develops a dense pyramidal crown with dark, shining leaves, making it a cheerful-looking tree. In addition, the slender downy twigs are bright red and the bark has a warm reddish tone.

The seeds are eaten by such birds as the pine siskin and the crossbills; and by the red squirrel, which often cuts the unripened cones to procure the seeds within them. The trees, particularly when growing in close formation, provide excellent winter cover for wildlife, but a dearth of food results when the areas are too extensive.

Pinus L. Pine.

Pinus was a name given by the ancients to several resinous, cone-bearing trees. Modern botanists, however, restrict the use of the term to members of this genus, which differs from other conifers in featuring slender, needle-like leaves arranged in definite clusters. There are about 80 species of pine, almost exclusively distributed in the northern hemisphere. They are evergreen trees and shrubs of decorative and commercial importance. Those growing in the warmer countries are often mountain trees, although in the southeastern United States they occupy considerable areas at little if any elevation above sea level; in more northern regions they frequently form extensive forests. Pinus is the classical Latin name for the native pine and was possibly used by the ancients on account of the resinous properties of the tree.

In addition to the pines of the northeastern states, more than 20 species occur in the southern and western states. Their soft or hard, straight-grained, resinous and often durable woods are suitable for many purposes, and some are among the most esteemed of timber trees. Pure forests of considerable extent are found in the southern states, in the Great Lakes region, and on the mountain slopes in the western and northern parts of the continent. A century of lumbering has almost cleared the northeastern states of pine timber, and, unless proper measures are taken, the pine forests of the southern and Great Lakes states will soon follow suit.

Pines have three types of leaves. As is the case with many other genera of the Coniferales, there is considerable difference between the juvenile and mature leaves. On seedling trees and trees a year or two old, the leaves are soft, produced singly, and surround the shoot; later, however, the mature or adult secondary leaves appear. They are longer and stiffer, sometimes rigid and sharp-pointed. The primary leaves, the third type, are thin and chafflike, merely bud scales, from the axils of which grow the secondary needle-shaped evergreen leaves; these, in ours, grow in fascicles of 2, 3, or 5 leaves. Each tuft represents a short branch that springs from the axil of a partially deciduous, scalelike leaf. Each cluster of leaves is bound at the base by a sheath. In some species the sheath falls very soon after the leaves are developed; in others it lasts until the leaves fall, which may take from 2 to 5 years.

Male and female cones are found on the same tree in spring or early summer. The numerous cylindrical, clustered male cones are borne at the bases of the young shoots. They are usually yellow or reddish in color with sessile sporangia which release an abundance of pollen through longitudinal slits. The female cones are reddish, pale pink, or sometimes other colors, appearing the first year as tiny structures, usually from the ends of young shoots. Pollen is conveyed by wind to the open female cones in the second year of their growth, when they become receptive to fertilization. In most species the seeds ripen and drop during the second season after the female cones appear, but in others there is a long period of dormancy.

The mature female cones are composed of numerous woody scales spirally arranged about a woody central axis, each bearing 2-winged (rare wingless) seeds; the cones differ much among the various species in size, shape, and hardness. Those of the soft pines, in which the leaves are usually in groups of 5, have softer scales than those of the 2- and 3-leaved hard pines. The cone scales of most of the soft pines open and the seeds are shed soon after they ripen. Cones of the hard pines are usually quite woody and the scales are often armed with stiff prickles. These cones remain closed longer than those of the soft pines; in fact, there are some in which the cones remain tightly sealed for many years and become buried in the bark. Such species even require the heat of a forest fire to open them in appreciable quantities, thus enabling them to reseed burned-over areas. When seed is to be extracted commercially from the cones of pines, it is not unusual to subject them to heat in order to soften the resin that seals the scales together so as to permit them to open.

Pines are among our most important forest trees, producing not only wood of the finest quality but also naval stores (turpentine and resin), pitch, and oil. Trees are tapped for this purpose in several parts of the world, the three most important areas being western France, the southeastern United States, and the Himalayas. If the pine forests are allowed to dwindle, the deficit of lumber will not affect world commerce as disastrously as cutting off production of naval stores. All the pines yield resin in greater or smaller quantities, but it is obtained commercially only from a relatively few species. The crude resin is almost entirely used for the distillation of oil of turpentine and resin. When the oil of turpentine is entirely distilled off, the residuum is resin; when only part of the oil is extracted, however, the viscus mass remaining is known as crude turpentine.

Oil of turpentine is a good solvent for many resins, wax, fats, sulphur, and phosphorus; it is largely employed in making varnish and oil paints. Resin is used not only by violinists for rubbing their bows but also in making sealing wax, varnish, and resinous soaps for sizing paper, papier mâché, and dressing hemp cordage, but one of its special uses is for making brewer's pitch for coating the insides of beer casks and for distilling resinous oils. Pitch is also used in veterinary practice. Tar is an impure turpentine, viscid and brown-black in color, procured by destructive distillation from the roots of various coniferous trees, particularly from Pinus sylvestris. Tar is used medicinally, especially in veterinary practice, for its antiseptic, stimulant, diuretic, and diaphoretic actions. Tar-water is given to horses with chronic cough and is used internally and externally as a cutaneous stimulant and antiseptic in eczema. Oil of tar is used instead of oil of turpentine in the treatment of mange and other skin afflictions.

A considerable industry has grown up in the United States in the distillation of pine wood by means of steam under pressure. One of the products thus obtained, which has considerable importance commercially, is known as pine oil. It has a pleasant odor and has been largely used for making paints which dry without gloss. It flows well under the brush, is a powerful solvent, and is useful for emulsion paints such as are now

much employed for inside work. Pine resins are not only much used by the soap-maker in the manufacture of brown soaps but also in a number of disinfectants. The trade in resins was for many years almost exclusively a French industry, and for many decades only in France were the pine forests turned to account for the production of resin on a commercial scale. Now, however, Switzerland, Sweden, Russia, and the United States furnish naval stores in large quantities.

In Germany and Sweden pine needles are treated to remove the resin and loosen the fibers, thus making "forest wool." This material is used to stuff cushions and mattresses, and blankets and garments woven of it are said to be warm and durable. Pine wood makes good kindling and the resinous pine knots obtained from old stumps or rotting logs will ensure a camp fire on rainy days. These knots can also be used as torches; they will burn for a considerable time. Pine wood makes a quick hot fire but it leaves only ashes rather than live coals, and it blackens the cooking utensils with soot and tar. Like other conifers or softwoods, hot sparks may shoot out from the burning sticks, not a desirable feature near tents. Pine seeds from some species are widely used either fresh or roasted under the name of pine nuts. Large quantities of the seed of the Stone Pine are exported from Italy, where they have been prized since the ancient days of Rome. Seeds of various North American pines are also used for food.

The 35 or more species and major varieties of pines native to North America north of Mexico can be grouped into two sections, the "soft pines" and the "hard pines." The soft pines are the delight of woodworkers, as they have soft, close-grained wood, with thin, nearly white sapwood not heavily impregnated with resin. Hard pines, on the other hand, have heavy, dark-colored wood that is full of resin, which is a nuisance to carpenters because it "gums up" their tools. One characteristic easily enables one to distinguish between hard and soft pines. The latter shed the papery sheath of their leaf bundles before the leaves themselves begin to fall, while hard pines retain the leaf sheath until the leaves are shed. In addition, the scales of the cones of the soft pines are usually unarmed, the leaves contain a single fibrovascular bundle, and, excepting those of the nut pines, the leaves are in 5-leaved clusters. There are 12 species of soft pines in North America north of Mexico, only one of which, the Eastern White Pine, is found east of the Great Plains; the others occur from the Rocky Mountain region to the Pacific coast.

Among the hard pines is a group called yellow pines, in which the leaves ordinarily occur in 3-leaved clusters; this group includes several of the most valuable trees in North America. Among them are the Longleaf Pine, P. palustris; the Loblolly Pine, P. taeda; and the Pitch Pine, P. rigida, all natives of the southeastern states, plus the Ponderosa Pine or Western Yellow Pine, P. ponderosa, of the Pacific states. The Ponderosa Pine is the chief lumber pine of the Pacific states, where it is second in importance only to Douglas-fir.

The various native species of pine constitute the chief source of softwood (coniferous) lumber produced in the United States. The production of pine lumber in this country for 1940 exceeded 15 billion board

feet. Commercially, the types of lumber cut from the various kinds of pine are known as white, yellow, ponderosa, sugar, and lodgepole pine and are classified under these descriptive names in the census of manufactures. Prior to 1900 the Eastern White Pine was one of the chief lumber-producing trees in America, but the original forests have become so depleted that this tree now contributes only a minor fraction of the lumber marketed as white pine.

Among the American Indians the pines were some of the most frequently used plants, both the bark and seeds of nearly all species being edible. Pines of the western states, however, contain larger and more delicious seeds than those of the east. These seeds have become popular in recent years as a health food, sold under the name "pignolia nuts" or "pine nuts." As for the bark, the phloem layer was so frequently employed as an emergency food by the Indians that the early explorers of North America found large areas of pine trees stripped of their bark, particularly in the Adirondacks, where the Indians ate quantities of it, especially "in the spring when it was full of sweet sap." This bark could either be boiled or eaten raw, and some tribes dried it for later use. In this connection, it is of note that the name Adirondack means "tree-eaters."

The Indians were also well aware of the medical properties of pine sap and pine pitch. In a letter to Gronovius, written in December of 1744, Cadwallader Colden stated that "The Indians likewise cure all sort of wounds without digestion by the Inner bark of the Pinus No 192 of the collection I sent you," which they soaked in water so long "as to make it soft & then apply it." Colden stated that it was reported to be "effective even in Gun shot wounds." John D. Hunter, writing in 1823, reported that "Sap pine" was used by Indians west of the Mississippi in the treatment of breast complaints and coughs as well as its being a favorite remedy for gonorrhea and "languid ulcers." "It relieves pain," he wrote, "arrests inflammation, reduces swelling, and disposes the parts to heal." Applied externally, it was considered an excellent remedy for rheumatism.

The Indians of California used heated resin of the Digger Pine to bring boils to a head and applied it as a protective, healing covering for burns, insect bites, cuts, swellings, and sores. Hot resin smeared on a warmed cloth was also used as a poultice in the treatment of muscular pains, soreness, and pneumonia. In Alabama, Indians boiled the inner bark of pine saplings in water and drank the liquid for flux. Indians often suffered from rheumatism as a result of being constantly exposed to the weather. In California a favorite remedy was the sweat bath, in the preparation of which a fire was built over some rocks and allowed to burn down. Pine twigs were then thrown upon the warm ashes and the patient, well wrapped in blankets, lay down upon them. Water was occasionally sprinkled on the rocks so that steam, together with the volatile oil from the leaves, was constantly given off. After inhaling these fumes and sweating profusely from 8 to 10 hours, the patient is said to be invariably able to move without pain. The Digger Pine was usually used in California, but other tribes similarly employed their local species.

Both the gum, turpentine, and oil of turpentine were used in American medicine. Turpentine is a liquid exuding from pines that solidifies

upon exposure, while oil of turpentine (often called spirits or spirit of turpentine) officially is the volatile oil distilled from the gummy exudations of the Longleaf Pine, P. palustris. Oil of turpentine is stimulant, diuretic, occasionally diaphoretic, anthelmintic, in large doses cathartic, and externally rubefacient. Medicinally, it is still employed in both general and veterinary practice as a rubefacient and vesicant; it is valuable also as an antiseptic. It is used for horses and cattle internally as a vermifuge; externally it is used as a stimulant, for sprains and bruises, and to kill parasites.

As a stimulant, oil of turpentine proved serviceable in the treatment of typhoid fever, its efficiency being ascribed, however, not so much to its stimulant properties as to "an alterative influence upon the ulcerated surface of the bowels characteristic of that disease." In the 1800's it was also recommended as a counterirritant in the treatment of yellow and puerperal fevers and other cases of gastric inflammations requiring resort to stimulation, as well as in the treatment of chronic rheumatism, sciatica, and lumbago. It was likewise highly regarded as a vermifuge, particularly in the treatment of tapeworm, and in addition was given as a diuretic in the treatment of dropsy. It was once considered a valuable remedy in bladder, kidney, and rheumatic afflictions, as well as in the treatment of diarrhea. It is still sometimes used medicinally as a rubefacient, diuretic, and irritant. Externally applied, oil of turpentine irritates and speedily inflames the skin, so it was considered useful as a liniment in the treatment of rheumatic and paralytic afflictions, and as an inhalant. For mild cases it was generally diluted with olive oil. The gum was used to treat kidney ailments, tuberculosis, and to increase or hasten menstrual flow. Spanish-speaking New Mexicans are reported to boil pine needles in water, mix the liquid with brown sugar, and drink the decoction as a remedy for syphilis.

Insofar as importance to wildlife is concerned, pines rank very near the top. Martin et al. (1961) report that their seeds make up more than half the diet of three birds--the red crossbill, Clarke nutcracker, and white-headed woodpecker--an unusual record. In addition, seeds of many species of pine rank high among the foods of nearly all game birds and such mammals as rabbits, squirrels, and chipmunks; they are even eaten by the coyote and black bear. Unfortunately, however, the annual crop of pine seeds varies considerably from year to year. Some species of grouse consume pine needles, while small rodents and porcupines eat the bark and wood. The twigs and needles also serve as food for deer, moose, and other browsing animals, but mostly under near-starvation conditions. In winter rabbits often attack young trees in plantations and sometimes trim them completely of needles, even nibbling off the branches as well. Young pines, particularly, provide valuable cover for gamebirds, fur bearers, hoofed browsers, and other ground animals. Older trees are favorite roosting places for migrating robins and commonly provide nesting sites for mourning doves. Pine needles are also used as nest material by several species of songbirds.

Key to Local Species of Pinus

1. Leaves mostly 5 per fascicle, the basal scales of the fascicle deciduous; leaves with 1 fibrovascular bundle; cone scales unarmed; wood soft, mostly without resin..... P. strobus
1. Leaves 2 or 3 per fascicle, with persistent tubular sheath; fibrovascular bundles 2; cone scales armed or unarmed; wood hard, with bands of resin, 2
 2. Leaves in 3's; cone scales armed with a sharp dorsal and subterminal spine or prickle..... P. rigida
 2. Leaves 2; cone scales unarmed, 3
 3. Leaves full green, 7-17 cm long; cones broadly ovoid-conic, reddish-brown, sessile, divergent..... P. resinosa
 3. Leaves blue- or gray-green, 3-7 cm long; cones slenderly conic, tawny or grayish, reflexed on a short peduncle..... P. sylvestris

Pinus resinosa Ait. Red Pine.

Meaning of Species Name. Resinous.

Other Names. "Norway Pine," Canadian Pine, Hard Pine.

Type of Plant. A forest tree, often 60 to 80 ft high with a trunk 2 to 3 ft in diameter.

Habitat. Dry woods or rocky soil.

Range. NS to Man, s to Mass, NJ, Pa, in the mts to WV, Mich, Wis, and Minn.

Distr in NYS. In woods, chiefly in the n part of the state; local southw to the Helderbergs, the Catskill mts, and reported from Inwood, NYC; westw to the pine plains of Rome; also in Yates co and Letchworth Park.

Distr in the Torrey Range. NY: Otis Summit, Greene co; Inwood, NYC, record unverified.

Elevation. 685-1723 ft in the Torrey range.

Time of Fl. May-Jun; May 25-Jun at Cornell.

Origin. Native.

Remarks. Wood compact, not strong, light red; wt 30 lb per cu ft. Needles 3-8 in. long, in 2's; cone scales without prickles; a tree of dry soils.

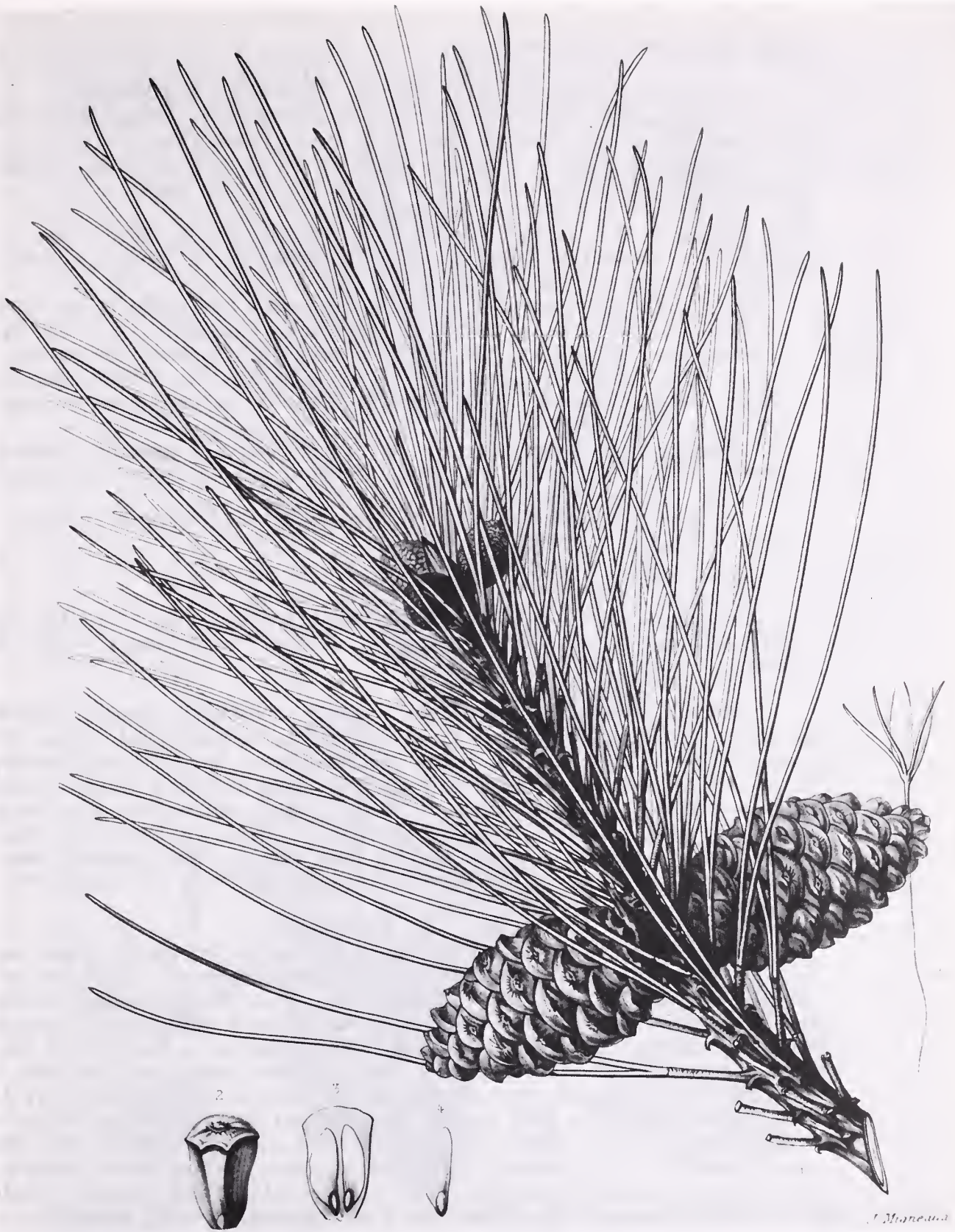
Red Pine gets its name from its colorful bark of armor-like plates, but it has several other names as well. North Woods lumbermen call it Hard Pine in contrast to the soft wood of the White Pine. No one seems to know why in some areas it retains its illogical name of Norway Pine, for it is native to North America, not Europe. According to Michaux, early English explorers mistook it for Norway Spruce, a European tree, and "Norway" it stayed. In New England it is widely held that the name derives from the town of Norway, Maine, but that town was not incorporated until 1787 and the name Norway Pine was then already in use. In any event, the name Norway Pine was so firmly entrenched that the U.S. Forest Service met with considerable criticism when it decided to use the more logical name of Red Pine.

Red Pine is a fairly large tree, often growing in company with White Pine and reaching its best development in the region of the upper Great Lakes. It is a valuable timber species and is now widely planted on reforested areas. Characteristically it is a tree of light sandy soils, growing well in areas too poor for White Pine. It makes rapid growth during its first 60 to 70 years, but thereafter growth proceeds at a much slower rate. It is usually found scattered through the forest, but in the Lake States it often forms nearly pure stands. Since it has recently attracted attention in the Catskills as a suitable tree for planting on abandoned fields, it can be expected to spread to hillside pastures and other areas much as the Scotch Pine has done. It is a "prolific seeder" and lends itself to "natural" reforestation.

Its sturdy reddish trunk contrasts markedly with the dark green, shining needles that form dense tufts at the ends of the branches, forming a broad symmetrical crown. The paired, somewhat glaucous, needle-like leaves are 4 to 6 inches long. The young cones are bright red, more showy than those of most other species of pine. The mature cones, 1 to 3 inches long with unarmed scales, are brown and shed their winged seeds in early autumn, but the cones persist on the branches until the following summer. Its wood is soft like that of the White Pine, and, though the epithet "*resinosa*" means "resinous," its wood is not so heavily impregnated with pitch as that of many other species. Its reddish bark and paired leaves reveal its kinship to the Scotch Pine, a European species now common in cultivation in the northwestern states.

The wood of this species is pale red, light in weight, and close-grained, but it is not durable in contact with the soil without chemical treatment. In some ways intermediate between the hard and soft pines, however, it appeals both to lumbermen and to horticulturists because it embodies the good points of both classes. Michaux (1851) remarks that "in Canada, Nova Scotia and the District of Maine, it is highly esteemed for strength and durability, and is frequently employed in naval architecture, especially for the deck of vessels, for which it furnishes planks 40 feet long without knots. Stripped of the sap, it makes very lasting pumps." At the beginning of this century Sargent reported that it was largely used in the construction of bridges, buildings, and piles as well as for masts and spars of ships, for which purposes considerable quantities were exported from Canada to Great Britain. Peattie (1950) states that in its heyday it was an important item in the Chicago lumberyards, where it was purchased for use in windmill towers, water tanks, sash, roofing, siding for cattle cars, and ladders, to say nothing of crating, derricks, and freight cars. The best Red Pine timber has long since been harvested, however, so its importance in the lumber trade has declined, but it is still used in building construction as well as for piling, masts, boxes, crates, and as pulpwood. In addition, home dyers may note that a yellow dye has been extracted from the bark.

It is considered by many to be a better tree for reforestation purposes than the much-planted Scotch Pine, and for horticultural purposes it holds its own by reasons of quick growth, hardiness, and beauty of color contrasts. It can readily be raised from seed, is an excellent tree for planting as a windbreak, and it grows well on sterile soil exposed to the sea where most other pines would languish.



Pinus resinosa--Red Pine
[From Sargent (1891-1902), vol. XI, Plate 556, p. 70.]

Pinus rigida Mill. Pitch Pine.

Meaning of Species Name. Stiff, alluding to the needles.

Other Names. Torch Pine, Sap Pine, Hard Pine, Yellow Pine, Black "Norway Pine," Candlewood Pine, Jack Pine, Black Pine.

Type of Plant. A tree sometimes 40 to 60 ft high with a trunk diameter of 1 to 2 ft, but usually smaller in our area.

Habitat. Dry, rocky, sandy, or barren soil.

Range. NB to s Ont, s to NY, Pa, Va, mts of Ga, Tenn, Ky, and O; seldom on the coastal plains s of NJ, where it is the dominant tree of the pine barrens.

Distr in NYS. Generally distr throughout the state below 1500 ft, but usually absent or rare in secs with calcareous soil and from moist wooded slopes and mts. Very common in LI and SI and on the hills up the Hudson valley, the Albany sand plains, w of L Champlain, about Oneida L, Lewis co, and on the Ontario lowlands from St Lawrence co westw to Monroe co.

Distr in the Torrey Range. NY: Throughout, decreasing northw; common s of the moraine on LI, and forming pine barrens e of Central Park.

Elevation. Grows to 3000 ft in Va; sea level-2100 ft in the Torrey range.

Time of Fl. Apr-May.

Origin. Native.

Remarks. Wood soft, brittle, coarse-grained, light reddish brown; wt 32 lb per cu ft. Needles 3 per cluster, 2-5 in. long, stiff, stout, mostly twisted.

This tree usually has a short, thick trunk with whorled, contorted, and often pendulous branches, forming a thick, round-topped crown, but when growing in exposed places the lopsided crown may be picturesquely broken and irregular. The short, shining, dark green, 3-leaved foliage clothes gnarled, rough branches in thick tufts, contrasting sharply with pale yellowish, usually clustered cones, the scales of which are armed with stout prickles. Dead and black after shedding their seeds, the cones tend to persist on the tree, suggesting hundreds of blackbirds clustered on the boughs.

Pitch Pine is characteristically a tree of dry rocky ridges and cliffs, although it is sometimes found in swampy areas. It is one of the few trees that will flourish in salt marshes; on the sand dunes along the New England coast it grows to the very water's edge where occasional high tides cover the roots. Peattie (1950) reminds us that it is the predominant tree in the famous pine barrens of New Jersey, on Cape Cod, and on storm-swept Montauk Point at the eastern tip of Long Island. It is also a characteristic tree on the more exposed rocky mountain ridges of Pennsylvania. It is quite resistant to fire and often is the only tree able to survive on repeatedly burned-over areas. It seldom attains a very large size in dry barren areas, but in cultivation it makes rapid growth when young and develops into a picturesque tree at maturity.

Its wood is light, soft, weak, and brittle but quite durable, not only in contact with the soil but also when subjected to alternate wetting and drying. Michaux (1851), whose Silva was first published in Paris,



Pinus rigida--Pitch Pine
 [From Sargent (1891-1902), Vol. XI, Plate 579, p. 118.]

1810-13, remarked that Pitch Pine was "thought better than Yellow Pine for floors that are frequently washed, as the resin with which it is impregnated renders it firmer and more durable. It serves perfectly well for ship-pumps, for which purpose trees with very little heart are preferred. The bakers of New York, Philadelphia, and Baltimore, and the brick-makers in the vicinity of these cities, consume it in prodigious quantities. From the most resinous stocks is procured the lamp-black of commerce." Some 65 years later Emerson (1878) considered this species "of far more value than it has usually been considered.... In Plymouth County, vessels have been made, in many instances, for a considerable time past, almost entirely of pitch-pine. For the upper floor, for the lower deck, and for the beams, the best oak only is superior.... It is an excellent material for floors, not yielding to the Southern pine in durability and surpassing it in beauty. For water-wheels, it is preferred, on account of its durability when exposed to alternations of wet and dryness. For the same reason it is selected ... also for aqueduct pipes ... It is also an excellent material for the sills of houses and barns, and for the sleepers of railroads and the stringers of bridges, and for the frame of mills and other structures in damp situations. It is preferred to any other wood in the Northern States as fuel for steam-engines, and vast quantities of it are also consumed for the supply of families. Formerly tar and lampblack were obtained from it. Now, from its increased value and scarcity, this use is rarely made of it."

During our two wars with Great Britain, Pitch Pine played an important role in New Jersey as charcoal for the manufacture of bog iron ore. Its wood is coarse-grained, full of knots, and hard to work, however, so it has a rather poor reputation and is now used only for rough lumber, cheap crate material, occasionally for mine props, for wharf piles, in the manufacture of charcoal, and as fuel wood. A major asset of this tree is its ability to spring up with amazing vigor after a fire. Suckers come up from the roots of fire-killed trees, a feature rare among conifers. Another important characteristic is its ability to grow on worthless land and in dry, rocky or sandy areas; thousands of seedlings have been raised to reforest barren lands where other trees cannot grow.

In colonial times tar and turpentine were obtained from the Pitch Pine. Both were used in medicine, not only during colonial times but also well into the 1800's. Dr. W. Beach, writing in 1857, called Pitch Pine stimulant, laxative, diuretic, pectoral, vermifuge, discutient, antiherpetic, detergent, balsamic, and vulnerary--an impressive list--and held that the bark and gum were useful in the treatment of rheumatism and consumption, increasing the menstrual flow, for treating kidney ailments, and as plasters for ulcers and sores.

The cones open at irregular intervals, some even during the winter, thus providing food for birds and small mammals such as the red squirrel, for which it is said to be a preferred food. It also provides shelter for a number of forms of wildlife. While this species no longer plays an important role in our domestic economy, this gnarled and picturesque tree still evokes an image of the wild and untamable, its strong pitchy odor and the heavy chant of the wind in its branches haunting the memory long afterward.

Pinus strobus L. Eastern White Pine.

Meaning of Species Name. An ancient name for some incense-bearing tree.

Other Names. White Pine, Weymouth Pine, Soft Pine, Soft Deal Pine, Deal Pine, American Deal Pine, Northern Pine, Northern White Pine, American White Pine, New England Pine, Spruce Pine, Sapling Pine, Pumpkin Pine.

Type of Plant. A tall tree, sometimes 150 ft tall, but usually only 60 to 80 ft high with a trunk 2-3 ft in diameter.

Habitat. Woods.

Range. Nf to Man, s to Del, NC, Ga, Ky, Ill, and Ia.

Distr in NYS. Throughout the state n of the coastal plain and of quite general distr, especially northw and in the Adirondacks up to 2500 ft; infrequent or rare on s LI.

Distr in the Torrey Range. NY: Throughout; rare on SI and uncommon s of the moraine on LI, but it occurs at West Hempstead, Jamaica, and near Riverhead.

Elevation. Grows to 4300 ft in NC; sea level-2100 ft in the Torrey range.

Time of Fl. Jun; Jun at Cornell.

Origin. Native.

Remarks. Wood light brown or nearly white, soft, compact; wt 24 lb per cu ft. This is the only pine in the Catskills with 5 needles per cluster.

The Eastern White Pine is one of our largest native evergreen trees, which in aboriginal America often grew 150 feet tall, with a massive trunk clear of branches for 80 feet or more. It formed nearly pure stands over vast areas and was perhaps the most abundant species almost throughout its range. Its twigs tufted with long blue-green needles, no evergreen is more beautiful when grown in a location sufficiently sheltered to prevent its supple branches from breakage by severe winds. In spring the somber coloring of the older foliage is lightened by the young yellowish-green shoots, the purplish color of the erect pistillate cones, and the yellow pendulous clusters of the staminate cones. The young pistillate cones stand erect until autumn, but the next season finds them hanging down. At the end of the second summer the scales have changed color from green to brown, and the ripe winged seeds are shed in autumn and distributed by the wind. The mature cones are 5 to 10 inches long, the broad unarmed scales squarish at the tips.

The first account of this tree published in English appeared in John Josselyn's Account of Two Voyages to New England, which appeared in 1674, but the tree had undoubtedly been taken to Europe by the earlier French explorers of Canada, for it was growing in Fontainebleu before the middle of the 16th century. Josselyn reported that "The Pine-tree is a very large Tree, very tall and sometimes two or three fadom about; of the body the English [of Massachusetts] make large canows of 20 foot long, and two and a half foot over, hollowing them with an adds and shaping of the outside like a boat."

The impact of White Pine on the domestic economy of both the colonial period and in 19th century America is well told by Peattie (1950),

upon whom the writer has leaned heavily for many details in the following account. No other tree, he remarks, has played so great a role for such an extended period of time in the life of the American people; for 300 years, until well after the turn of the present century, White Pine was unrivaled as a timber-producing tree. Aside from fish and fur, it was the only great export of early New England and within 30 years White Pine was being shipped not only to England but also to Portugal, Spain, Africa, and the West Indies. England, mistress of the seas and forever at war, produced no mastwood of her own. She had to depend upon Russia, Prussia, and Sweden for supplies of Scotch Pine, supplies which the Danes could cut off completely at any time simply by closing the entrance to the Baltic Sea. The arrival of the first White Pine in England therefore created a sensation and, long before the Revolution, emissaries of the king went through the woods to blaze the best trees to mark them for later use as main masts for his ships of the line. And since colonial times until around 1900, White Pine was the most important conifer of the northeastern states, being a favored timber for construction of all sorts.

White Pine gained its importance from many factors, not the least of which was the great abundance of the forest and the continuity of its stands. This made possible the development of a concentrated industry based upon mass production and mass marketing, with consequent cheaper rates to the consumer. In addition, it was the most generally useful wood our country has ever produced. Its soft light wood warps and checks less than most timbers and is adapted to a variety of uses. Writing of the period around 1805, Francois Michaux estimated that half a million homes had been constructed of this material. He has left a sharply detailed picture of lumbering methods during the early 1800's:

"The persons engaged in this branch of industry are in general emigrants from New Hampshire, led by the desire of amassing rapidly the means of purchasing a hundred acres of land for the establishment of their families. In the summer they unite in small companies, and traverse the vast solitudes in every direction to ascertain the places in which the Pines abound. After cutting the grass and converting it into hay for the nourishment of the cattle to be employed in their labor, they return home. In the beginning of winter they enter the forests again, establish themselves in huts covered with the bark of the Canoe Birch or the Arbor Vitae, and though the cold is so intense that the mercury sometimes remains for several weeks from 40 to 45 degrees of Farenheit, below the point of congelation, they persevere with unabated courage in their work. When the trees are felled they cut them into logs from 14 to 18 feet long, and by means of their cattle, which they employ with great dexterity, drag them to the river, and, after stamping on them a mark of their property, roll them upon its frozen bosom. At the breaking up of the ice in the spring, they float down with the current. All the logs that come down the Kennebec are stopped at Winslow, about 120 miles from the sea, where each person selects his own, and forms them into rafts with the intention of selling them to the proprietors of the numerous saw-mills between that place and the sea, or of having them sawn for his own benefit at the price of a half or even three quarters of the product in abundant years."

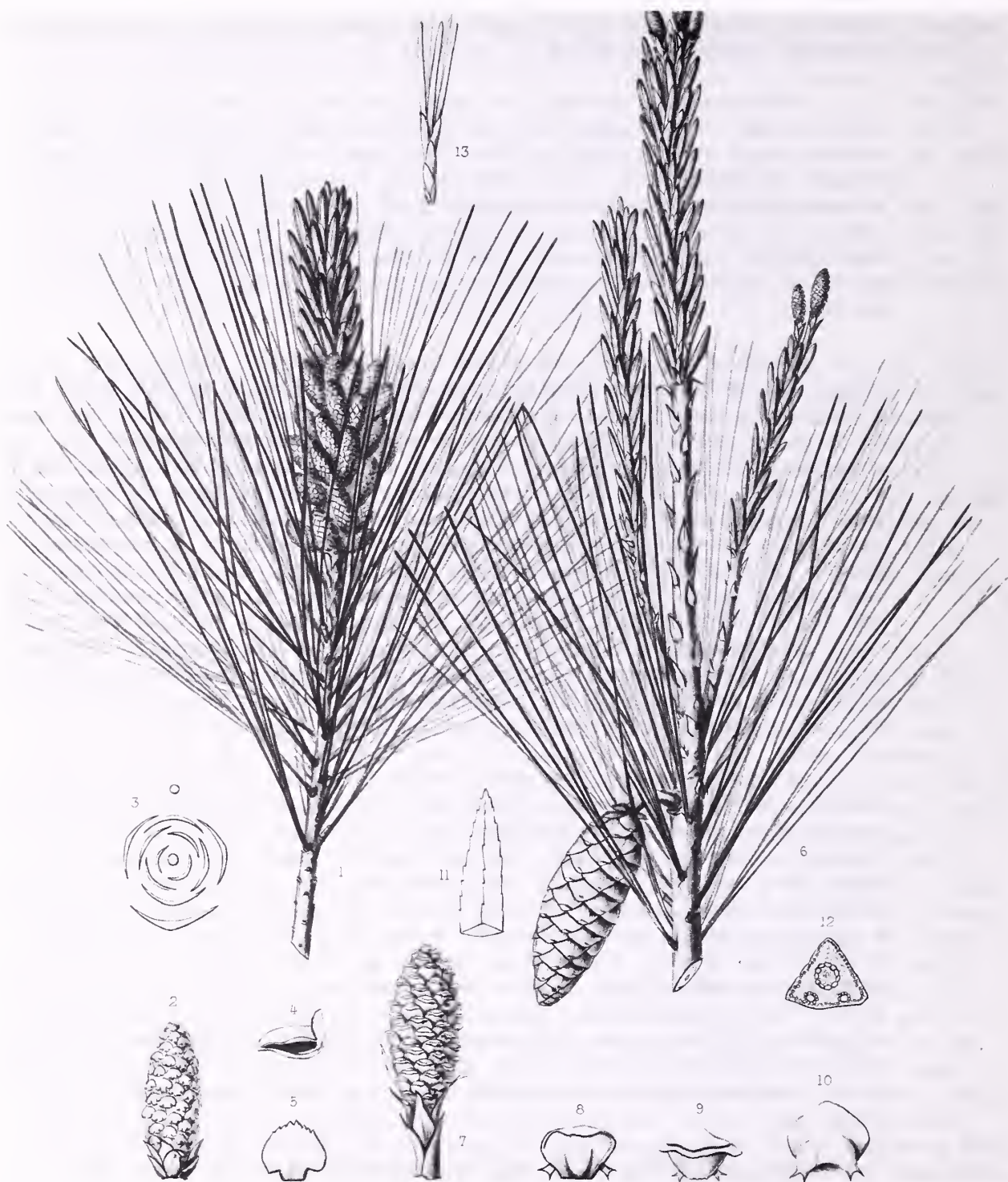
Michaux furnished precise figures for one small region: "By an extract from the custom-house register of Fort St. John, the quantity of this wood that passed down the Sorel for Quebec, between the 1st of May, 1807, and the 30th of July following, was 132,720 cubic feet of square timber, 160,000 feet of common boards, 67,000 feet of planks 2 inches thick, 20 masts, and 4,545 logs of the same dimensions as are brought from the District of Maine."

Michaux even wrote a few words concerning lumbering in the Catskill region: "The upper part of Pennsylvania, near the source of the Delaware and Susquehanna, which is mountainous and cold, possesses large forests of this Pine, and in the spring the timber floats down these streams for the internal consumption of the State. It enters into the construction of houses both in the country and in the towns, and is sawn into planks for exportation from Philadelphia to the West Indies. The masts of vessels built at Philadelphia are also obtained from the Delaware."

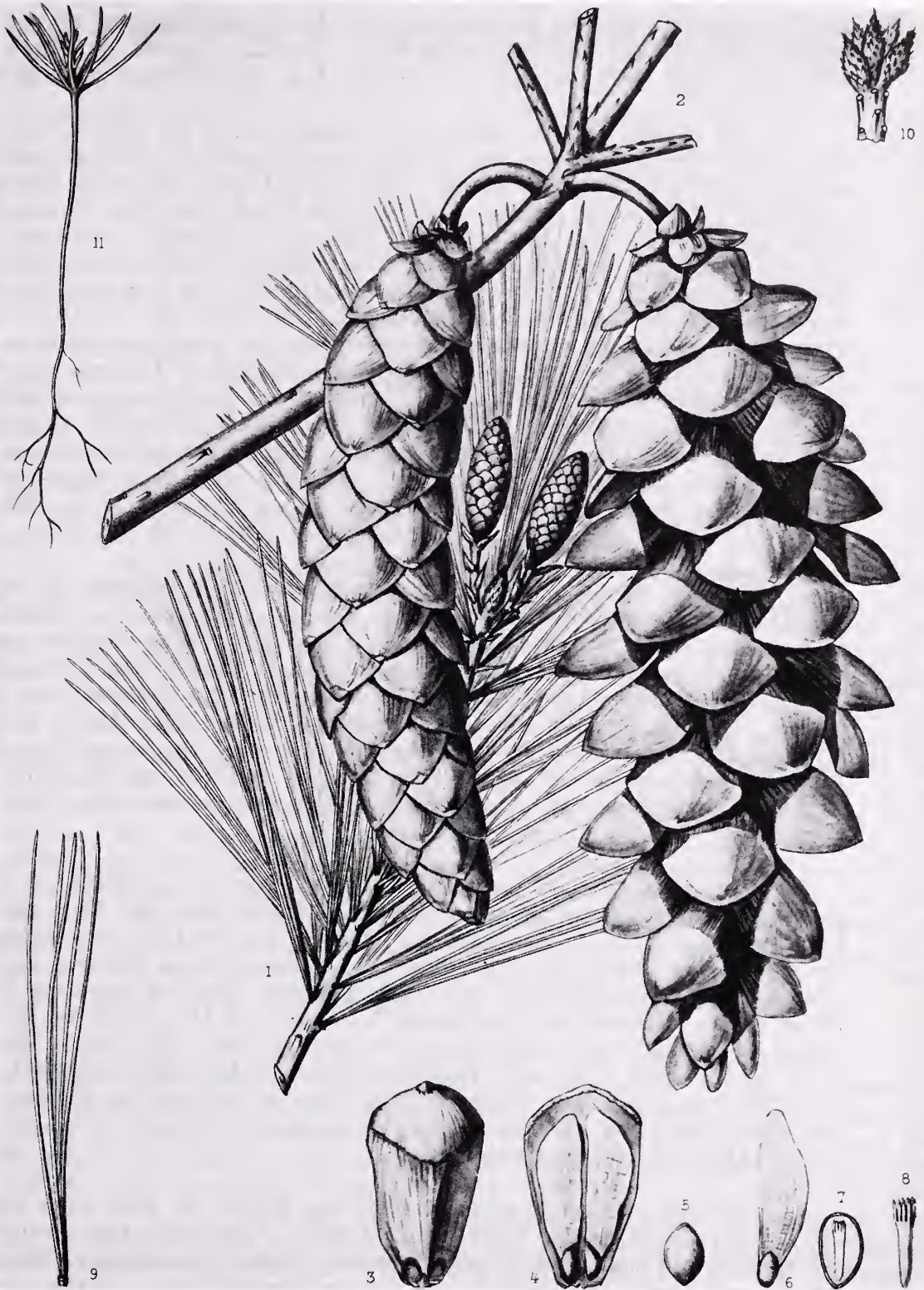
Wood of the White Pine "is also formed into clap-boards and shingles," he continues. "The shingles are commonly 18 inches long, [and] from 3 to 6 inches wide ...: they should be free from knots, and made only of the perfect wood. They are packed in square bundles ... The bundles sometimes consist of 500, but oftener of 250 shingles: the price at Hallowel, in 1807, was three dollars a thousand: two men can make 1600 or 1800 in a day." "East of the river Hudson, the houses are almost invariably covered with these shingles, which last only twelve or fifteen years. They are exported in great quantities to the West Indies." Even in Michaux's day it was becoming evident that this vast resource would not last indefinitely. "The vast consumption of this tree for domestic use, and for exportation to the West Indies and to Europe, renders it necessary every year to penetrate into the country, and inroads are already made, in quest of this species only, upon forests which probably will not be cleared for cultivation in 25 or 30 years."

It is no wonder that the demand for White Pine reached such heights, for no other wood served so well for window-sash material and no other furnished such large boards for doors and interior finish. It was used for every sort of millwork, the heddles of looms, untold amounts of cheap furniture, and the number of shingles made for roofing American homes and barns is beyond calculation; for two centuries they were hand-rived with a frow, and in 24 years Michigan, Wisconsin, and Minnesota together produced 85 billion of them. Most of the covered bridges of the northeastern states were made of White Pine in preference to almost any other wood because of its long-lasting qualities and its lightness in proportion to its strength. It had other more prosaic uses also. Peattie reports that in 1912 some 72,000,000 board feet of this now precious wood were still being split into matches; Western White Pine has since been used for this purpose.

The exploitation of this unrivaled natural resource was so complete in the northeastern states that by 1900 virgin White Pine was nowhere to be found except in the southern Appalachians, where the boom lasted from 1900 to 1915. But the tragedy of the almost total loss of this great natural resource taught us a few lessons, for White Pine



Pinus strobus--White Pine (young cones)
 [From Sargent (1891-1902), Vol. XI, Plate 538, p. 22.]



Pinus strobus--White Pine (mature cones)
 [From Sargent (1891-1902), Vol. XI, Plate 539, p. 22.]

dramatized the situation as no other tree had done and served to rouse public opinion to the support of the conservationists, who for 20 years had fought without allies. It was too late to save the White Pine, but public opinion rallied in time to save the great forests of the western states and to back Theodore Roosevelt, the U.S. Forest Service, and the National Parks Service in their battle for conservation measures.

One of the hopeful phases in the story of the White Pine is the fact that new forests are springing up naturally in the northeastern states where early lumbering denuded great tracts of land, for natural reproduction is good. Maine, one of the first states to lose its eminent position in the production of White Pine timber, once again leads the nation; after nearly a century, the second growth in that area has reached maturity, but probably never again will we see such majestic specimens as grew in the virgin forest. In addition, millions of White Pine trees have been planted for reforestation purposes in areas unfit for agriculture, particularly since pine is one of the most valuable of timber crops. White Pine is still one of our most valuable timber trees, in current demand for general construction work, interior finish, and cabinet-making, for it is light, easily planed and polished, and takes paint better than almost any rival. Furthermore, as a shade or ornamental tree, White Pine has few rivals among the pines. It makes rapid growth in its youth and is adaptable to a variety of soils.

In pure stands White Pine is often greatly damaged by the pine weevil, the larvae of which destroy the terminal leader. This tree is also susceptible to a fungal disease, the White Pine blister rust, inadvertently brought over from Europe and now firmly established here. One stage of this disease infects the leaves of gooseberry and currant bushes (Ribes), from which the spores can infect pine trees to a distance of some 1000 feet. Only the spores produced by the stage infecting these bushes can infect White Pine, so the disease can be controlled by eliminating gooseberry and currant bushes from areas where White Pine grows.

The uses of this species, however, were not limited to its value as timber. The juicy inner bark of the White Pine has long been known as an emergency food, extensively used by the Indians as a dependable source of food in times of scarcity. It was also a popular morsel to chew in many regions where the tree abounds; few are the farm boys of those areas who have not gathered "slivers" of this bark to chew while tramping through the woods in May or early June. But White Pine bark as a food is not likely to find much favor with modern palates, for it is bitterish and has a rather strong hint of turpentine flavor. But if one should get lost in the woods, he need not lack for food in areas where pine bark is available.

New Englanders even candied young shoots of this tree in former days. First boiled in water until tender, they were then cooked for 20 minutes in a syrup made of equal parts of sugar and water, drained, the shoots partly dried, then rolled in granulated sugar, making a confection somewhat more "civilized" than the foods prepared Indian fashion. But for most people the seeds will probably provide a more attractive food, although they are not to be compared with the delicious seeds of the nut

pinus native to the western states. The pungently spicy seeds of both the White and Red Pines were gathered by many Indian tribes for cooking with meat. Their flavor may be too pungent for some tastes, but the resin is less evident if the seeds are gathered in August when the cones are ready to open, and Kephart suggests roasting them to remove some of the resinous taste. The Ojibwas are reported to have gathered the firm unexpanded cones of this species to stew with meat; when cooked, they are said to be sweet and not pitchy, but again, they are not likely to meet with a very favorable reception by most people. Branches of White Pine are also used for Christmas wreaths and sprays, for which it is ideal. Unlike those of hemlock and spruce, White Pine needles are persistent in the hot, dry conditions found in most modern apartments. As the pine oil volatilizes, it brings to the room the same pleasant odor that one experiences in driving through pine country on a hot summer day.

Throughout its range White Pine played an important role in Indian affairs, both as a food and in medicine. Medicinally it was one of their most important plants, use being made of its needles, buds, bark, cones, roots, and pitch. In New England the Indians boiled White Pine needles in water to make a tea for the prevention of scurvy, a most effective remedy, for these needles contain five times as much vitamin C as an equal weight of lemons in addition to being rich in vitamin A. Pine needle tea is made by pouring 1 pint of boiling water over 1 ounce of finely chopped pine needles. Served with lemon and sugar it makes a quite palatable drink, but, as with most other White Pine dishes, a taste for it no doubt needs to be cultivated. This drink was also taken as a cure for sore throat. Other tribes inhaled fumes of the heated needles for backache and crushed them to make an application for headache and backache. Densmore (1928) reports that wood from the trunk of a young pine tree, together with the inner bark of Prunus serotina and P. americana, were used by the Chippewas to prepare a poultice used in the treatment of cuts and wounds. The wood was chipped and boiled with the bark until it was soft. The mixture was then strained, reserving the decoction, and the woody material was pounded into a mash and dried. When needed, the mash was thoroughly soaked in the decoction and applied to the wound, care having been taken "that the barks after boiling do not come in contact with rust or dirt." It was stated that this mixture was successfully employed in the treatment of a gunshot wound after gangrene had set in, and that the mash "could be applied to any form of 'rotten flesh,' after which a knife was used to cleanse the wound."

Indians used the buds in decoction as a laxative, while the pitch or resin formed the basis of a salve used externally in the treatment of rheumatism, muscular pains, burns, sores, and wounds. It was likewise used as a remedy for coughs. Boiled in water, the resin or gum was taken internally for colds, sore throat, and respiratory ailments. The inner bark was also used in a number of ways. Boiled as a tea, it was drunk in the treatment of colds and pains in the chest in addition to being used as a cough medicine; soaked in water and pounded into a pulp, it served as a poultice for cuts, sores, burns, scalds, and wounds, and a decoction from the inner bark of saplings was used to treat dysentery. The roots likewise were boiled and pounded to make a poultice, and the young cones were used to treat rheumatism.

The early colonists brought with them knowledge of the medicinal uses of European pines, so it is not surprising that they were receptive to similar use of native species, especially when it was learned that they were highly regarded by the Indians as effective remedies for a number of ailments. In Massachusetts John Josselyn, writing in 1663, reported that the White Pine "yields a very sovereign turpentine for curing desperate wounds." In 1849 Dr. Williams, reporting on the indigenous medical botany of Massachusetts, stated that the Indians used White Pine bark as a poultice for piles and ulcerations and that they made a "drawing plaster" by boiling the roots, inferring that it might be so used in American medicine. Pine tar, resin, and turpentine from Pinus palustris and other species of pine were official drugs in the U.S. Pharmacopeia, 1820-1916, the first as a disinfectant, deodorant, and insecticide, while the resin and turpentine were used primarily in plasters and ointments. In addition, the bark was highly regarded for its expectorant properties and its ability to reduce swollen tissues. Not only was the bark much used during the 1800's as an ingredient in several trademarked pharmaceutical products for treating pulmonary ailments, it was included in the National Formulary, 1916-65. Although it is no longer considered an official drug, it is still employed as an ingredient in commercial cough syrups and is much in current demand by drug companies manufacturing such products. The bark is often mixed with extracts of wild cherry, sassafras, and honey to improve its flavor.

Cottontail and snowshoe rabbits occasionally eat the bark of young trees, and porcupines may cause extensive damage by eating the bark. The cones are eagerly sought by red squirrels, and the seeds are eaten by such birds as the crossbills and the pine siskin. It is also occasionally browsed by the white-tailed deer.

Pinus sylvestris L. Scotch Pine.

Meaning of Species Name. Of woodland.

Other Names. Scotch Fir, Norway Pine.

Type of Plant. A tree sometimes 120 ft high but usually only 70 to 90 ft high with a trunk 2-3 ft in diameter.

Habitat. With us, usually at edges of woods and thickets and in pastures.

Range. NE to Ont, s to NJ, O, and Ia.

Distr in NYS. Extensively used in forest plantations; natural reproduction occurs and it will doubtless become commonly natzd as existing young plantations approach maturity.

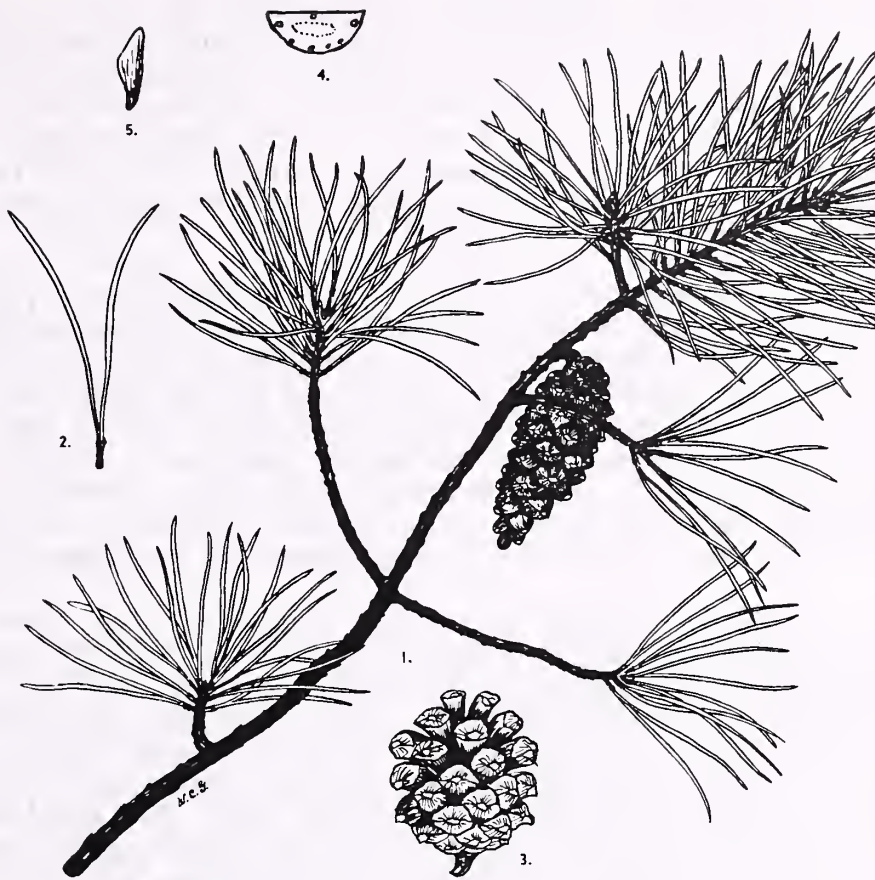
Distr in the Torrey Range. Not listed in Taylor (1915).

Time of Fl. May-Jun.

Origin. Natzd from Eu.

Remarks. Much cult and locally natzd. Wood reddish brown; wt 30 to 40 lb per cu ft. Needles 2 in a cluster, cones without prickles; upper bark bright orange.

When grown under optimum conditions, Scotch Pine is one of the most picturesque of the 2-needled species, of conical habit when young, but in maturity acquiring a spreading mushroom-like top with a straight trunk. The gnarled branches are clothed at their extremities with rather



Pinus sylvestris--Scotch Pine
[From Grimm (1962), p. 429.]

short, glaucous, green, often twisted leaves that contrast strongly with the reddish-brown bark. The staminate cones fill the air with their sulphur-like pollen in late May or June to pollinate the purple pistillate cones, which at first are erect and sessile but later become re-curved on a lengthening stalk. Fertilization does not occur until the following summer. The female cones do not reach maturity until the autumn of the second year, but they seldom open to scatter their seeds until the third year.

P. sylvestris is a European tree, growing in central and northern Europe and in northern Asia, extending from the shores of the North Sea across Europe and Asia to Kamchatka. It is particularly abundant in the Scandinavian peninsula. It is the fir (*fur*, *fura*) of the old Norsemen and still retains that name in Great Britain in spite of the fact that it is a pine. Introduced in southern Britain, it has escaped to many of the sandy moors, forming naturalized stands of large extent in many areas. The heartwood of the finer specimens is deep brownish-red in color and abounds in resin, to which its durability is no doubt due, for it is as lasting as oak for all indoor and most outdoor purposes. It is one of

the most important timber trees in the economy of northern Europe, where houses are chiefly constructed of its lumber, particularly in Poland and Russia. Log huts are made of the smaller trunks and roofed with its bark. It is but little inferior to oak for ship planking and, because of its lightness and elasticity, is well adapted for the construction of yachts and other small, fast-sailing craft. It is ideal for masts and large spars, and great numbers of young trees are cut annually for railway ties and mine props. It has also been much used for wood pavement in some areas.

Scotch Pine was early introduced into this country as an ornamental tree and has since found widespread use in eastern North America in reforestation projects, but it is definitely inferior to our native pines for this purpose. It grows rapidly in its youth and is tolerant of varied soil, moisture, and climatic conditions, but in this country it does not grow so large as in its native range and is here likely to be a comparatively short-lived tree, averaging a life of some 40 years. It is a useful hardy ornamental tree, however, resistant to city smoke. Young Scotch Pines also find a ready market as Christmas trees.

In northern Europe the dried inner bark of this species has long been an important staple in times of scarcity. In 1732 Linnaeus found the Laplanders subsisting largely on the bark of this "fir." He stated that when fed to cattle and swine, the ground bark proved fattening and bread made from it was nutritious, but to his taste it was not too palatable. A. Morlot, writing in 1860, reported that when boiled, the inner bark furnished "a very edible broth," of which the Laplanders were quite fond. The inhabitants of Norway and Sweden made similar use of this bark, strips of which were cut from the trees in spring and fastened to the barn to dry over summer. Then, as necessity demanded, the dried bark was ground up and mixed with oatmeal, rye, or other flour to make thin cakes and "famine bread." White Pine is also important as a source of emergency food and would likewise be a good source of meal, but few people are likely to undertake the long process required to make it as described by Linnaeus, writing of Pinus sylvestris in northern Europe:

"Some people make bread of the bark of fir-trees. For this purpose they choose the bark of such trees as are of a large size, but with few branches, because the branches, as well as the younger trees, are more resinous, and therefore more strongly flavoured. The bark taken from the lower part of the tree is esteemed the best. The hard external coats require to be carefully removed. Stores of this bark are often laid by for winter use. Previously to its being ground into flour, it is laid over a slow fire in order to be warmed through, and rendered more friable, for it becomes by this means much thickened and very porous. It is next ground and baked, in the same manner as barley.... The dough made of fir bark is more compact than barley dough, and almost as much so as that made of rye; but the bread has a bitterish taste."

Large quantities of turpentine are extracted from Scotch Pine in Sweden and in the USSR by removing a strip of bark, terminating below in a deep notch cut in the wood, into which the turpentine runs, and from which it is scooped as it accumulates; but the product is not equal to that of the Silver Fir and other species. Tar, chiefly obtained from the

roots, is also obtained from P. sylvestris. Country people in Europe have also used the Scotch Pine as a source of dye materials, obtaining "mordore" from the fresh bark, "nankin" from the barked wood, and a hazelnut color (noisette) from the leaves.

Tsuga Carr. Hemlock.

Hemlock is the name commonly given in North America to trees of the genus Tsuga. They are evergreen trees, natives of North America, the Himalayas, China, and Japan. The genus comprises 14 species, four of which are native to temperate North America, two in the Pacific states and two in eastern North America. The eastern hemlocks have their leaves arranged in a flat spray, appear to be 2-ranked, and have a basal cushion. They are silvery white underneath by reason of pale lines on the underside of the flat, blunt-pointed blade. An abundance of pendant cones is borne annually. The wood of most hemlocks is of comparatively little value, but the bark is rich in tannin, and so hemlocks have long been important in the leather trade. The name of the genus is derived from the Japanese name of one of the species.

They share with other conifers a dislike for atmospheric impurities and are therefore unsuitable for gardens in or near towns where the atmosphere is laden with smoke or chemical fumes. They can stand partial shade, but they are trees for somewhat sheltered locations; in wind-swept areas their foliage is apt to "burn" (turn brown at the tips of the leaves) and they do not prosper. The Western Hemlock, T. heterophylla, is a valuable timber tree. Its wood is greatly superior to that of all other hemlocks, comparing favorably with that of pine or spruce. Two Japanese species are often cultivated as ornamental trees.

The four hemlocks of North America were utilized throughout their ranges by various tribes of Indians, who were well aware of their value both as food and in medicine. In the east the Iroquois boiled the young leaves of the Eastern Hemlock to make hemlock tea. The inner bark of the western hemlocks was dried and pressed into cakes, which, mixed with salmon oil, were considered as delicacies by the Indians of British Columbia. In Sitka the bark was often mixed with roots, berries, and train (whale) oil. In an emergency the bark of both eastern and western hemlocks is edible in the raw, uncooked state.

Martin et al. (1951) remark that the dense low foliage of young hemlocks makes excellent winter cover for ruffed grouse, wild turkey, deer, and other wildlife. They also state that "Hemlock groves are also favorite nesting places for several kinds of northern birds--the veery, black-throated blue warbler, black-throated green warbler, blackburnian warbler, and junco." In addition, the small, winged seeds are important sources of food for a number of other birds and for several rodents, including the red squirrel. Porcupines are fond of Eastern Hemlock and "occasionally kill young trees by stripping the bark and wood."

Tsuga canadensis (L.) Carr. Eastern Hemlock.

Meaning of Species Name. Of Canada.

Other Names. Hemlock, Spruce Pine, Hemlock Spruce, Hemlock Spruce Pine, Canada Hemlock, Canadian Hemlock, Hemlock Pine, Suga, Spruce, White Hemlock, Wisconsin Hemlock Pine, Hemlock Fir, Red Hemlock, Tan-bark Tree, Water Spruce, Weeping Spruce.

Type of Plant. A tall forest tree growing 60 to 80 ft high with a trunk diameter of 2-3 ft.

Habitat. Mostly hilly or rocky woods.

Range. NB to Ont and Minn, s to Del, WVa, along the mts to Ga and Ala, O, Mich, and Wis, with outlying colonies in Ind.

Distr in NYS. Frequent or common in nearly all secs of the state except LI and SI, where only a few scattered individuals are now found.

Distr in the Torrey Range. NY: A single tree at Old Place, SI, and at Roslyn, LI; common throughout the rest of the state, increasing northw.

Elevation. Grows to 2000 ft in the Adirondacks; sea level-2400 ft in the Torrey range; observed above 3000 ft in Delaware co.

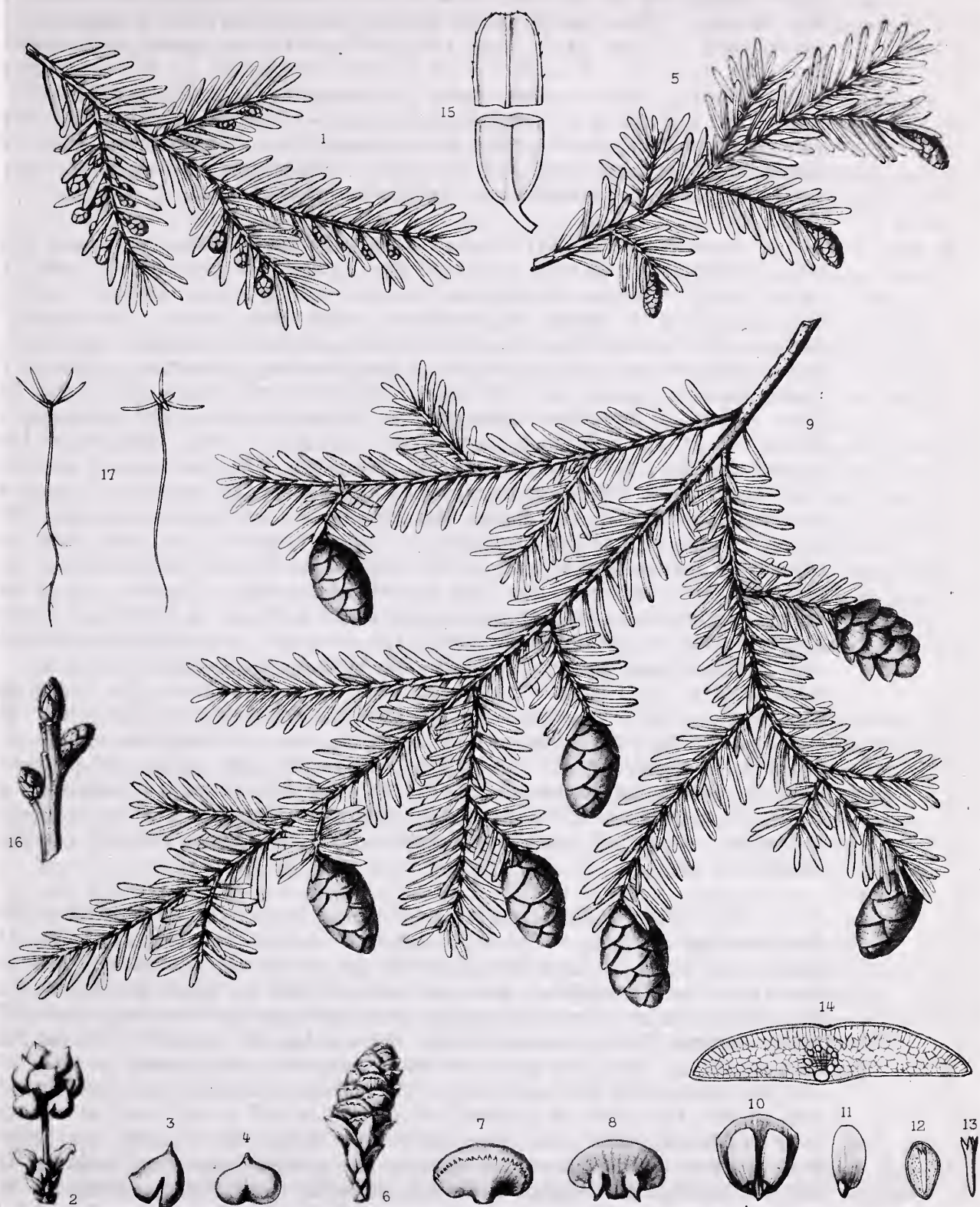
Time of Fl. Jun at Cornell.

Origin. Native.

Remarks. Wood soft, weak, brittle, coarse-grained, light brown or nearly white; wt 26 lb per cu ft. The needles of Abies balsamea, with which this species might be confused, are not stalked and have circular bases, while the needles of T. canadensis are attached by slender stalks.

The Eastern Hemlock is usually common in upland forests. At maturity it is a large, handsome tree, one of the hardiest species, that in the virgin forests commonly attained a height of over 100 feet and a trunk diameter of 4 feet. Grimm (1967) remarks that many of the larger trees found in the primeval forests have trunks 15 feet or more in circumference. "Foresters tell us," he states, "that hemlock trees reach maturity at an age of 250 to 300 years, and may live to an age of 600 years or more." Elsewhere (Grimm, 1962), he mentions that many of them "were more than four centuries old." When growing in the open, the tree has a dense conical crown and the lateral branches may extend nearly to the ground, but when growing in dense stands the trunks are often clear of branches for a distance of 80 feet or more. Hemlock thrives in cool, moist situations, frequently occurring along streams and the borders of swamps and bogs or on steep north-facing slopes. It is rather tolerant of shade but comparatively slow of growth. In its natural habitat it commonly associates with White Pine and various northern hardwoods, but occasionally it forms practically pure stands.

In the rocky uplands the drooping lower branches sweep the ground, and in winter the tree is often half buried in snow. "But," as described by Rogers (1926), "in spring every twig is dancing and waving yellow plumes of new foliage, the picture of cheerfulness as the sunlight sifts through the tree-tops. In May the new blossoms sprinkle all the leafy twigs--the staminate, yellow; the pistillate, pale violet. Looking up from below, one sees a charming iridescent effect when the blossoms add their color to the shimmering silver which lines the various platforms of foliage. The little red-brown cones cling to the twigs all winter,



Tsuga canadensis---Eastern Hemlock
 [From Sargent (1891-1902), Vol. XII, Plate 603, p. 66.]

slowly parting their scales to release their winged seeds. Squirrels climb the trees in the fall and cut off these cones to store away for winter use." When young, this native tree is one of our most graceful evergreens. It is hardy, yet its feathery-tipped branches present a delicate outline. It grows more rugged and somber as it approaches maturity, but it then becomes more picturesque. Its foliage is soft to the hand, beautiful in sunshine and shadow. As an ornamental, therefore, Eastern Hemlock has much to recommend it. Young trees will grow under considerable shade and can also be trimmed to advantage, the latter an important consideration in using them for hedges.

In the early 1800's, when plenty of White Pine was still available, hemlock was little utilized for lumber because of its hard, coarsely grained, brittle, splintery, usually knotty, and not very durable wood, but even then it served the mountain people for joists, scantling, girders, and subflooring. At a later date, nearly a century ago when pine was no longer readily available in many areas, lumbermen somewhat revised their opinions as to its utility. Emerson, writing in 1878, stated that "The timber of hemlock is wanting in strength, [but its] firmness is great and it is very durable when not exposed to the atmosphere [for, since] it has little resin, it ill bears the alternations of moisture and dryness. It is therefore employed, together with spruce,... as a substitute for white pine, where the latter has become scarce, for the frames of all kinds of buildings which are to be covered, for the board covering of wooden houses which are to be clap-boarded, and particularly, on account of its hardness, for the threshing-floors of barns. It is preferred to other woods for the material of lathes, and for any purpose where stiffness is wanted without the property of yielding or elasticity, and is excellent for corn-chests, as rats or mice cannot gnaw it. It is much used in the large Atlantic cities as a substitute for stone in the pavement of streets, for which purpose it is sawn into hexagonal blocks of eight inches in thickness, and eight, ten, or eighteen inches in breadth." Today one of its chief uses is for the making of pulpwood used in the manufacture of paper, although considerable lumber is manufactured for rough building construction, boxes and crates, as well as pulpwood. The fact that the leaves fall upon drying makes it a poor Christmas tree.

The early settlers also soon found that its bark could be used for tanning leather. Although inferior to oak for this purpose, its great abundance in many sections of the northeastern states, particularly in the Catskills, made harvesting hemlock bark a major industry. For 200 years and more the trees were stripped in the most wasteful manner. Rogers (1926) described the harvesting of hemlock bark as follows: "'Peelers' go into the woods in May, when the new growth is well started and the bark will peel readily. They fell and strip the hemlock trunks and remove the bark in sheets, which are piled to dry and be measured like cordwood, and later shipped to the tanneries." Only the broad thick bark of the lower trunks was taken; the peeled logs were left in the forest to decay. To leather the bark imparts a red tone, liable to rub off in use, but it served in immense quantities for tanning. Sargent (1891-1902) remarked that hemlock bark "is used in enormous quantities in the manufacture of heavy leather, and also in the production of the finer grades of leather, when it is mixed with Oak bark to modify the red color

of leather tanned entirely with Hemlock bark. An extract of the bark is used by tanners instead of the bark itself, to strengthen their bark liquors. It is also employed by dyers to modify the shades of logwood coloring, especially when copper sulphide is used as a mordant."

As with other conifers, Indian tribes in areas where this species abounds seldom failed to make some use of it. Of the "Hemlock-tree, a kind of spruce," Josselyn wrote in 1672, "The Indians break and heal their swellings and sores with it; by boyling the inner bark of young hemlock very well; then knocking of it betwixt two stones to a playster; and, anointing or soaking it in soyls' oyl, they apply it to the sore. It will break a sore swelling speedily." Many Indian tribes made medicinal use of both the leaves and inner bark of this species, sometimes combining them with other medicines to obtain the desired result. A tea brewed from the leaves was administered to induce perspiration to break up colds and relieve feverish conditions, to disguise the taste of more unpleasant medicines, and to alleviate pains in the abdomen. Some tribes also used the leaves in their sweat baths. Other tribes crushed and powdered the dried inner bark for internal use in diarrhea, to heal cuts, and to stop the flow of blood from wounds. A tea was sometimes prepared from hemlock bark for coughs, colds, and influenza. The Chippewas used the fresh leaves of hemlock to prepare a beverage. As a matter of fact, Densmore (1928) reports that they seldom drank fresh water. As soon as camp was made, hemlock, spruce, or pine needles, leaves of the Wintergreen Berry, Black Birch twigs, or whatever might be at hand were usually gathered fresh for making a tea. The inner bark of this species was dried, pulverized, and applied dry to control hemorrhage from wounds, often in combination with other ingredients. The inner bark, together with "a little grindstone dust" was also used in the preparation of a mahogany dye.

The early colonists were quick to learn of the medicinal virtues of this tree from the Indians; the high tannin content of the bark made it a valuable curative for burns and sores. It was much used in American medicine, even in the late 1800's, concerning which Millspaugh (1892) wrote at some length: "The stimulating effect of hemlock is well known and greatly utilized. A tired hunter arises fresh and invigorated from his bed of hemlock boughs, and the patient of the city physician, seeking health in our northern interiors, finds supreme comfort in a bath, in which hemlock leaves have been slowly steeping for some hours before his ablution, and quiet, refreshing slumber awaits him upon his couch of soft branches. A strong decoction of hemlock bark has received the praise of empirics and the laity as an astringent enema in diarrhoea and injection for leucorrhoea, prolapsus uteri, etc.; the oil as a liniment in croup, rheumatism and other disorders requiring its stimulant action; and the essence as a diuretic and a remedy to allay gastric irritation and colic, and to correct acidity of the stomach."

Hemlock contains much less sap than most other species of the Pinaceae and very little flows from incisions made into its trunk. But in late maturity the juice exudes more spontaneously and hardens on the bark, in consequence of the partial evaporation or oxidation of its volatile oil. During the last century this encrusted bark was often stripped from the tree, broken into pieces, and boiled in water, concerning which Sargent (1891-1902) wrote that "Canada pitch, formerly known as Hemlock

resin, is an opaque brittle resin ... obtained from Tsuga canadensis by boiling the wood and bark around knots with water, and skimming off the resin which rises to the surface.... [It] was formerly used as a substitute for the similar Burgundy pitch in the manufacture of medical plasters, and was collected in considerable quantities." Collecting hemlock pitch was at one time an important industry in northern Pennsylvania, large quantities being taken to Philadelphia, where it was further refined by melting and straining through linen or canvas. Canada pitch, an oleoresin, was official in the U.S. Pharmacopeia, 1831-94, for use as an external application in plasters as a counterirritant in the treatment of chronic rheumatic pains. A liquid extract from the inner bark of this species was used to some extent as an astringent and to promote perspiration. Hemlock is still in current demand by manufacturers of pharmaceutical products.

Oil of hemlock, a volatile oil obtained from this species by distilling the young branches and leaves, has been used in veterinary liniments; obtaining this oil was once an important industry in some parts of New York State, where it was obtained in winter by distilling the leaves and branches in water in small portable copper stills and worms set up in the woods. Eight pounds of branches yielded on an average an ounce of oil. This oil has also been employed to produce abortion, but it is extremely dangerous for this purpose, in effect endangering the life of the patient as a result of serious peritonitis. Pregnant ewes are said to lose their lambs from gnawing the bark of this species.

Hemlock bark provided settlers of the eastern United States with another good source of reddish-brown dye, applied to both wool and cotton. When combined with an alum mordant, the mature bark resulted in a durable bright reddish-brown hue on wool and an impermanent nankeen (brownish-yellow) on cotton. Copperas mordant produced dark drab and slate colors. It is still used as a brown dye for wool in the southern Appalachians.

Our native hemlock tree is not to be confused with the Poison Hemlock of European origin; this poisonous herb, a member of the Carrot family, is best known for its role in the death of Socrates.

A very good tea can be made from the young twigs and leaves of the Eastern Hemlock tree by steeping them in a pot of hot water for 10 minutes, a drink much used by the early settlers. This tea is still a favorite drink among lumbermen in some parts of Maine and Canada. They no doubt got the idea from the northern Indians, who relished this drink. Sprays of the young twigs were also used to a limited extent in New England and elsewhere as one of the ingredients of spruce beer and root beer.

Thickets of young hemlocks provide excellent winter cover for forest wildlife. Although deer often browse rather extensively on the foliage, it apparently has little actual nutritive value. The snowshoe rabbit or varying hare and the cottontail rabbit also feed on hemlock to some extent during the winter season, and the seeds are eaten by such birds as the veery, three warblers, the junco, pine siskin, crossbills, wild turkey, and various species of grouse. W. L. Bebb has observed porcupines cutting branchlets in the tops of these trees; these fans appear to attract deer.

CUPRESSACEAE, the Cypress Family

This family is of world-wide distribution, composed of 15 or 16 genera and about 140 species, occurring on all continents but not present in the tropics and presenting interesting instances of discontinuous distribution. Juniperus is the largest genus. Domestically, the family is represented by 5 genera, with Juniperus being most widespread over much of the United States. Many genera contain important timber-producing species, and domestically some genera are leading sources of wood for cabinet work, shingles, lead pencils, and construction purposes. Many genera are cultivated domestically for ornamental purposes, a volatile oil extracted from crushed juniper berries is the principal flavoring ingredient of gin, and oil of cedar is obtained from arborvitae.

Although several species of this family are popularly known as cedars, only members of the old world genus Cedrus, including the cedars of Lebanon, Tunisia, and Himalayas, can be considered true cedars from the botanical standpoint. They may be seen in the northeastern states only where planted for decorative purposes. They are unique in possessing larchlike clusters of needles, which remain evergreen.

Key to Local Genera

1. Plants monoecious; cone small and dry with small winged or angled seeds; leaves opposite and somewhat 2-ranked..... Thuja
1. Plants dioecious (rarely monoecious); cones fleshy, drupelike, with coalescent scales and ovoid, bony, wingless seeds; leaves opposite or in 3's, not 2-ranked..... Juniperus

Juniperus L. Juniper.

There are about 60 species of juniper--aromatic, evergreen trees or shrubs, chiefly of the north temperate zone but extending into the tropics of America and Africa; they are widely distributed in Europe, Asia, North America, the West Indies, and eastern Africa. Several species are restricted to the western parts of the United States, especially in semiarid regions. The name of the genus is the ancient Latin name of the juniper.

The junipers are divided into two groups according to the kinds of leaves they bear; the mature trees of one group have very small, closely appressed, scalelike leaves; those of the other group have loosely arranged, needle-like leaves, well represented by Juniperus communis. Sometimes the same plant produces both kinds of leaves on separate branches, or the young plants produce acicular leaves while those of the older plants are scalelike. The male and female cones are usually produced on separate plants. The mature female cone is fleshy, with succulent scales fused together to form a berry like structure. The berries are reddish, purplish, or bluish in color, varying in size from 6 to 13 mm in diameter. They thus differ considerably from the cones of other conifers. The seeds are usually three in number and are marked with large glands containing oil.

The wood of the junipers is fragrant and very durable. It has often been used for fencing, but the larger trees are of value for numerous other purposes. In the south of France the wood of J. oxycedrus is distilled to obtain a medicinal oil, known as oil of cade. This "oil" is a kind of tar obtained by distillation from the interior wood. It has long been employed in the treatment of cutaneous diseases of horses, sheep, and other livestock. It has also acquired much reputation in consequence of its extensive and successful use in France in the treatment of psora, scaly skin afflictions, and advanced stages of eczema. A kind of soap is prepared from the oil that can be applied to the surface of the skin, like any other soap.

The Savin, J. sabina, abundant in the mountains of central Europe, is an irregularly spreading, much-branched shrub with scalelike, glandular leaves that emit a disagreeable odor when bruised. This plant acts medicinally as a powerful local and general stimulant, diaphoretic, emmenagogue, and anthelmintic. It has been much used in amenorrhea, occasionally as a remedy for worms, and was once highly regarded for the relief of chronic rheumatism; it was also much employed in Germany, both internally and externally, in the treatment of chronic gout; but it had to be used with caution, for overdoses resulted in dangerous gastrointestinal inflammation. In powder or infusion, savin was also used in Europe as an application to warts, indolent and gangrenous ulcers, psora, and tinea capitis; the expressed juice of the fresh leaves, diluted with water, was sometimes used for similar purposes.

Many junipers are extensively grown as ornamentals, especially varieties of the Savin, the Common Juniper, and the Eastern Red Cedar. Many of them are hardy and form good trees for garden decoration; some are small enough for the rock garden, some are good foundation plants, and others grow into trees of moderate size.

The junipers make excellent survival food because the berries, though somewhat bitter and having a resinous taste, are edible and available through part of the winter. Also, the inner bark is edible and was eaten by many Indians to fight off starvation. Some tribes preserved the berries by drying, then utilized them throughout the winter by baking the ground-up fruit into cakes or making a mush. Some Indian tribes roasted juniper berries and ground them for use as a beverage. The Indians of British Columbia prepared an astringent tea by boiling the stems and leaves. Indians of Arizona and New Mexico used the berries from Cherrystone Juniper, J. occidentalis, to flavor meats; they are said to impart a taste similar to that of sage. They were also prepared as food by drying, after which they were ground into flour, mixed with water, kneaded into a hard mass, and again dried in the sun. These cakes were reported to be "easily digested, and not offensive." As late as 1870 J. R. Dodge reported that "Mexicans consume this fruit in large quantities, and it constitutes an article of trade with them."

Native junipers were also much used as medicine by various tribes of Indians throughout North America, but because some writers applied the name "juniper" without distinguishing the various native species, it is often impossible to determine the species to which they refer. The Cree Indians used "juniper berries" as a diuretic. Other tribes dried the

leaves and ground them into a powder, which was dusted over indolent sores. The root was given in infusion for gravel. In other areas "juniper" was boiled for a whole day, "until the gum was given off, when the decoction was taken as medicine for shortness of breath." A tea of juniper leaves was drunk by Zuni women to relax their muscles following delivery. The Piutes prepared a tea from the terminal twigs of the shrubby Rocky Mountain Juniper, J. scopulorum, for use in the treatment of syphilis, while the Hopi Indians rubbed the leaves into their hair after bathing to remove dandruff. The Blackfoot Indians used the berries of the same species to make a tea for treating kidney ailments. In studying records of the Indians' use of native plants in medicine, time and time again one is brought face to face with their intimate knowledge of medicine. The Indian use of juniper berries in the treatment of kidney diseases is a case in point; Oleum ex Baccis Juniperi, oil of juniper berries, was listed in the Pharmacopoeia Londinensis of 1618, a substance long used in European medicine as a diuretic.

Martin et al. (1951) remark that junipers are important to wildlife throughout the country, except in the prairies. Their twigs and foliage are eaten extensively by hoofed browsers, but the chief attraction to wildlife is the berry-like fruit. "The cedar waxwing, living up to its name, is one of the principal users of cedar berries, but numerous other birds and mammals, both large and small, make these fruits an important part of their diet." In addition to their food value, cedars provide important protective roosting places and favored nesting sites for various kinds of birds; their dense protective shelter is especially valuable in winter. Cedars, particularly the Eastern Red Cedar, not only have ornamental value, but their value to wildlife makes them especially worth planting. On the other hand, Juniperus virginiana is an alternate host for apple rust; it can therefore be detrimental to apple orchards.

Key to Local Species of Juniperus

1. Leaves in whorls of 3, 8-14 mm long, all needle-shaped and sharp-pointed, jointed at the base, without glands, with 2 white bands above; cones axillary; plant a low bush with spreading branches..... J. communis
1. Leaves opposite (rarely whorled), 0.5-1.5 mm long, all or partly scalelike and appressed, not jointed at the base, the scalelike ones usually with a dorsal gland; cones terminal; a tree, sometimes shrublike but erect..... J. virginiana

Juniperus communis L. ssp. depressa (Pursh) Franco. Dwarf Juniper.

Meaning of Species Name. In clumps; ssp. name, depressed.

Other Names. Ground Juniper, Common Juniper, Horse Savin, Hackmatack, Gorst, Fairy-circle.

Type of Plant. A prostrate shrub.

Habitat. Poor rocky soil of pastures, dry woods, fields, dried bogs, and rocky hills.

Range. Nf to Minn, s to NJ, Pa, mts to NC, Va, O, Ind, Ill, and Minn.

Distr in NYS. Common on all the exposed summits of the Adirondacks below 4000 ft and in the Catskills, and locally on exposed

ridges, rocks, bogs, and barren soil in many secs of the state northw and westw; local on LI.

Distr in the Torrey Range. Under J. siberica Burgsdorf: NY--LI and up the Hudson valley to Dutchess co.

Elevation. Collected at 2000 ft in Delaware County.

Time of Fl. May 1-15 at Cornell.

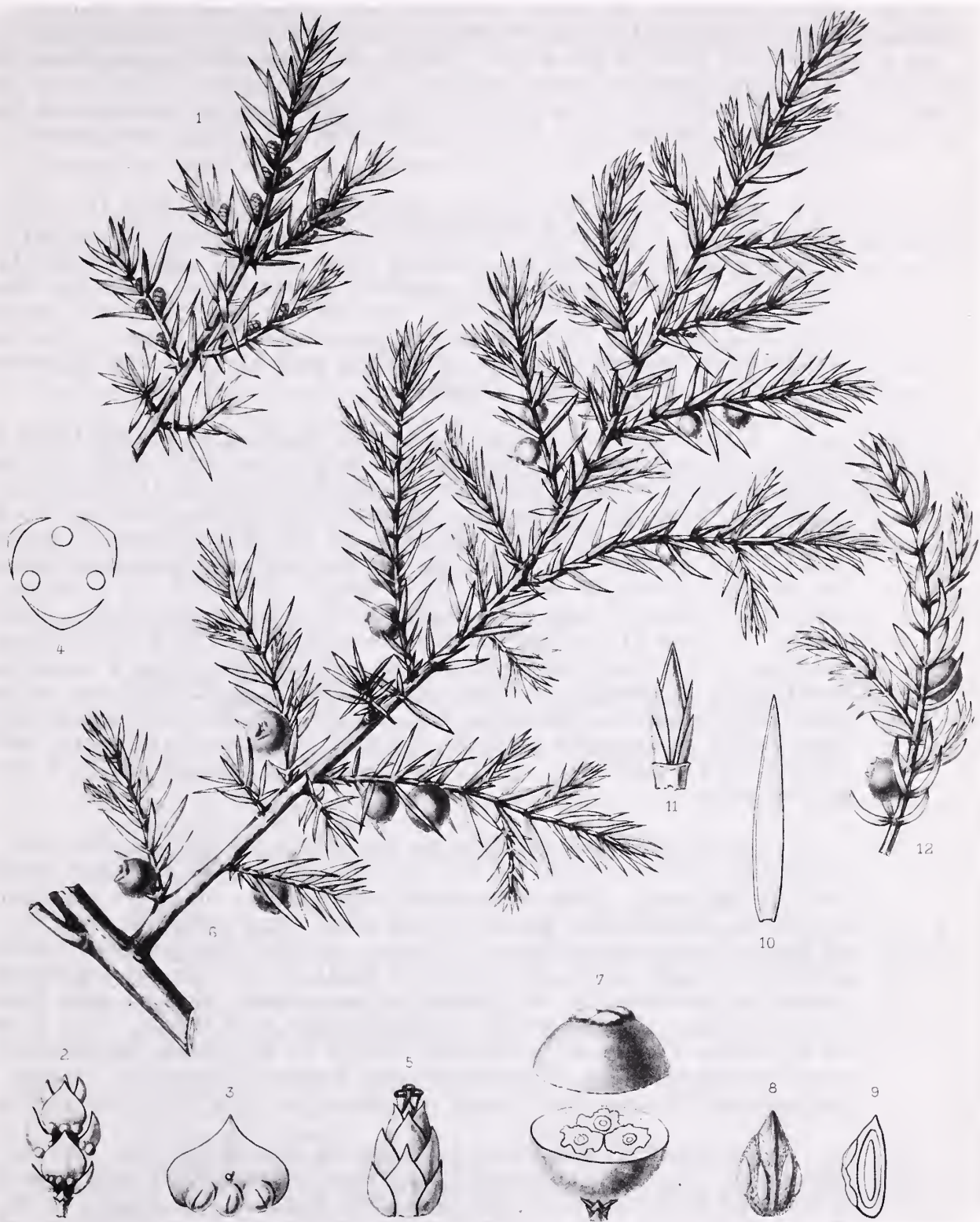
Origin. Native.

Juniperus communis is a very widely distributed circumpolar plant, occurring in the whole of northern Europe, central and northern Asia, and North America. It grows at considerable elevations in southern Europe, occurring at 4000 to 8000 feet in the Apennines, the Alps, the Pyrenees, and the Sierra Nevada. It has what is perhaps the widest natural range among all trees; certainly it is the only conifer native both in North America and Europe. It is commonly of tree size in the Mediterranean basin; but in this country, as in northern Europe, it is usually only a shrub, sometimes with creeping stems, forming a circular clump. Yet in the mountains of New England, in eastern Pennsylvania, and, reportedly, on the high mountains of North Carolina, it sometimes grows 24 feet high. The trunk may be as much as a foot in diameter but is always short and contorted. Ordinarily, however, it seldom grows over 4 feet in height. In the northeastern states it is characteristically found with its close relative, the Eastern Red Cedar. The small shrub is known botanically as Juniperus communis ssp. depressa, while the tree is J. communis ssp. communis; only the shrub has so far been reported in the Catskills.

The slender branchlets of the Dwarf Juniper are clothed with awl-shaped leaves which spread nearly at right angles from the twigs in whorls of three. Each one is sharply pointed, green on one side and white on the other. The small cone at first looks like a flower bud and does not enlarge much during its initial year, but when the cones again appear in early spring, the upper scales become consolidated around the ovules, and by the commencement of the second winter the berry is about three-fourths grown; it is then light green, hard, and globe-shaped, and the seeds are still soft and milky. The following autumn (the third season since fertilization), the "berries" are mature and covered with a glaucous bloom over the dark blue skin. The flesh is fragrant, sweet, and resinous-tasting, and much devoured by birds. If not eaten, the berries may remain a year or two on the tree after ripening. Each cone contains two or three seeds, which require 3 years to germinate.

Emerson (1878) reports that "In Europe it is used for walking sticks, and for various small articles of the turner. It makes excellent fuel, and is used in Scotland and Sweden for smoking hams. The bark is made by the Laplanders into ropes. The berries are principally used in making gin ..." The wood has also been used in Europe for vine stakes because it is so durable in contact with the soil, and in India it is burned as incense.

It is the volatile oil obtained from the berries that is the prime ingredient in gin (a name derived from juniper through the French genievre), upon which its flavor primarily depends. Although these valuable berries are produced from a native shrub in Great Britain, the berries of commerce are chiefly collected from plants growing in central and southern Europe.



Juniperus communis--Common Juniper
 [From Sargent (1891-1902), Vol. X, Plate 514, p. 78.]

The oil distilled on the continent, principally in Hungary, comes chiefly from freshly picked berries. It has hitherto not been possible to produce the oil in Great Britain to compete with southern Europe because of the relative cheapness of labor and the vast tracts of land over which the trees grow wild in the latter region. But the rise in the price of foreign oil of juniper since World War II has directed attention to the possible extended production of the oil, either in Great Britain or her northern colonies. The yield of oil, however, varies considerably in different years.

Commercial oil of juniper is obtained chiefly from the ripe cones and is stated to be in all essential qualities superior to the oil of juniper from the full-grown, unripe, green berries used medicinally, which has a balsamic, burning, somewhat bitter taste. Blue and green cones occurring on the same plant represent 2- and 3-year-old berries. Only the blue, ripe berries are gathered in Great Britain. After being collected in baskets or sacks, they lose some of the bloom and develop the blackish color seen in commerce.

Ripe berries were formerly used in England as a substitute for pepper. In many parts of Germany the berries are used both as a culinary spice and for flavoring sauerkraut. The housewife in the Catskill region might well experiment with the ripe berries of either this or the following species as a seasoning in cooking, as the flavor somewhat resembles that of bay leaves. In Sweden the berries are used to make a conserve, "which they generally eat with their bread for breakfast, as we do butter." They also prepare a beer from these berries, regarding it as a healthy drink. In some places the berries are roasted and used as a coffee substitute. In France a kind of beer is made by fermenting a decoction of equal parts of juniper berries and barley. In parts of India the berries are added to spirits distilled from barley. In many hot countries the tree yields by incision a gum or varnish. The fruit is readily eaten by most animals, especially sheep, and is said to prevent and cure dropsy in the latter.

In the United States during the 1800's juniper berries were sometimes collected and taken to the Philadelphia market from New Jersey. But, though equal to the European in appearance, they were considered inferior in strength and were not much used; those obtained from the south of Europe were much preferred. Juniper berries are gently stimulant and diuretic, imparting to the urine the smell of violets but occasionally producing disagreeable irritation in the urinary passages when taken in large amounts. During the last century they were chiefly used in medicine as an adjuvant to more powerful diuretics in dropsical complaints. They were recommended also in scorbutic and cutaneous diseases, catarrh of the bladder, and "stonic conditions" of the alimentary canal and uterus.

An infusion, prepared by macerating an ounce of the bruised berries in a pint of boiling water, was more convenient to make than other methods of preparation; a pint was often taken in the course of 24 hours. This infusion was also used to induce menstruation, relieve gas and colic, and to treat kidney and chest complaints, scrofula, snakebite, and intestinal worms. Some tribes of Indians made a poultice of the macerated needles and twigs to treat wounds. The wood yields cedar oil, formerly

much used in the treatment of chronic disorders of the genito-urinary tract. It was given as a diuretic and stomachic in indigestion, flatulence, and diseases of the kidney and bladder. Mixed with lard, the oil was also used in veterinary practice as an application to exposed wounds to prevent irritation from flies. The dried berries of J. communis and its subspecies depressa were official in the U.S. Pharmacopeia, 1820-1947, and in the National Formulary, 1947-55, as a diuretic, emmenagogue, and genito-urinary antiseptic. Both berries and wood are still in demand by companies manufacturing pharmaceutical products.

The hardiness of Juniperus communis makes it useful as a cover for wasteland on seashores or on land in any exposed situation. In addition, this species supplies food for numerous gamebirds and songbirds as well as a number of mammals, both large and small.

In Lapland the natives obtained an "oxblood brown" dye for wool from the twigs of this species and beets. A quantity of the twigs was boiled until a dark liquid resulted. This liquid was strained before adding alum, tarter, and baked red beets cut into pieces. The yarn to be dyed was then added and stirred to get an ecru color. After letting the yarn steep for 2 days, the whole was heated and stirred for at least 1 hour. If the resulting color was too light, a little copper sulfate (blue vitriol) was added. In Norway the blue berries provided a brown dye. The wood, bark, and even the yellow lichen growing on the branches were also found useful in dyeing.

Juniperus virginiana L. Eastern Red Cedar.

Meaning of Species Name. Of Virginia.

Other Names. Cedar, Red Cedar, Eastern Red Juniper, Savin, Red Savin, Red Juniper, Juniper-bush, Carolina Cedar, Pencil-wood, Pencil Cedar, Virginia Juniper, Virginia Cedar, Redcedar Juniper, Cedar-apple, Evergreen, Juniper.

Type of Plant. A shrub or tree, usually 30 to 40 ft high with a trunk diameter of 1 to 2 ft.

Habitat. Dry (rarely wet) open woods, rocky slopes, and barrens, frequently calcareous.

Range. Que and Me to ND, s to NJ, Ky, Ala, and Tex.

Distr in NYS. Very common in the Hudson valley, less frequent s of the moraine on LI, abundant in the Mohawk valley, uncommon northw outside the Adirondacks, rare in the sw counties of the state, and uncommon or rare westw to L Erie.

Distr in the Torrey Range. NY: Throughout, decreasing s of the moraine on LI.

Elevation. Sea level-2500 ft in the Torrey range.

Time of Fl. Apr-May, fr Sep-Oct; fl Apr 15-30 at Cornell.

Origin. Native.

Remarks. Reaches its largest size in dry calcareous habitats. Wood soft, not strong, straight-grained, compact, odorous, red, the sapwood white; wt 31 lb per cu ft.

The Eastern Red Cedar is also known as Eastern Red Juniper, the latter name being a more appropriate one, for, from the botanical standpoint, the tree is really a juniper and not a cedar. Young trees

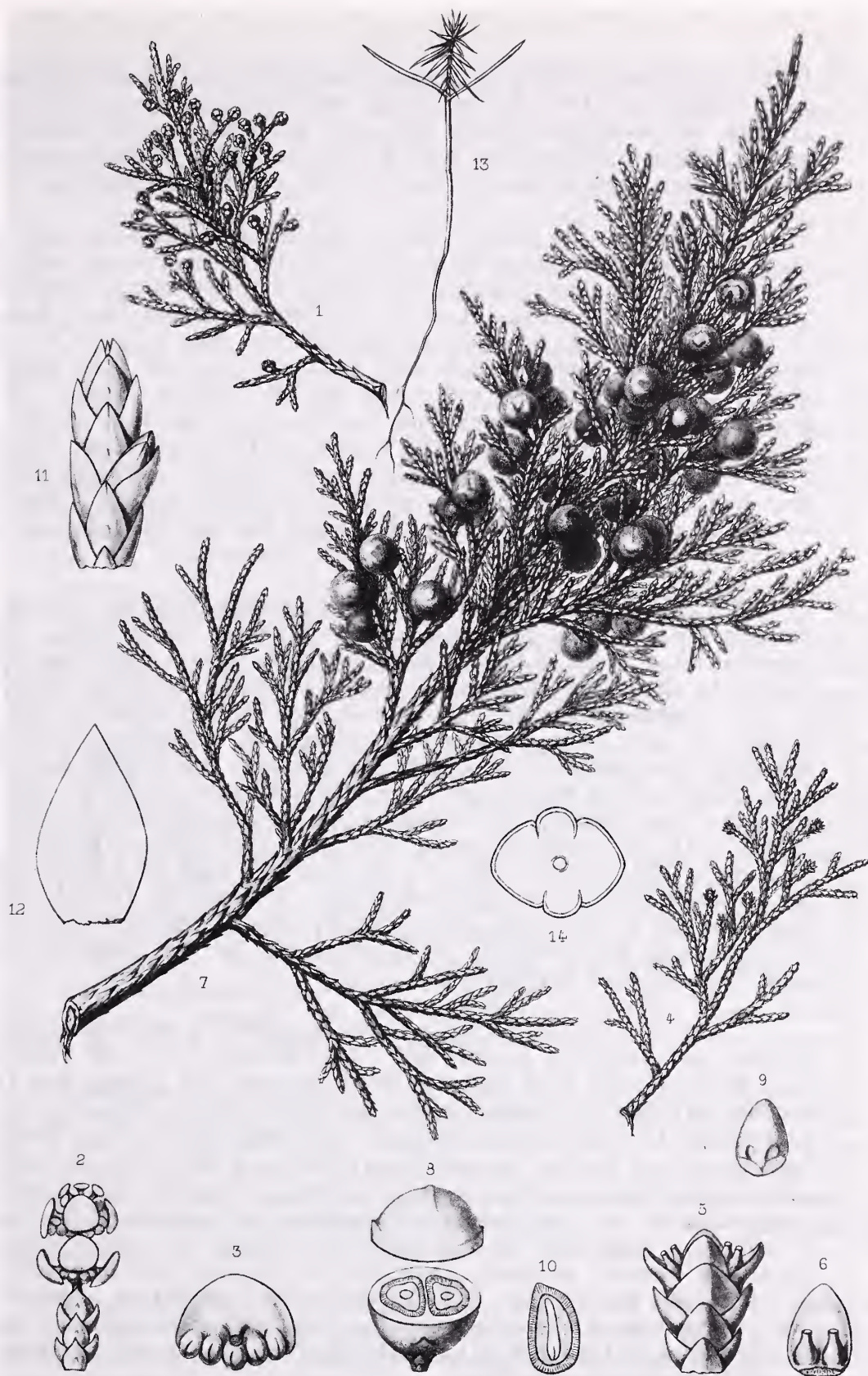
characteristically have narrowly conical or columnar crowns, but in age the tree becomes rather irregular and round-topped, often with a twisted trunk. It is typically a tree of dry and rocky soils. In aboriginal America this tree probably formed extensive groves, sometimes excluding almost all other trees, remnants of which are still to be seen occasionally on the limestones of eastern Tennessee and Kentucky, where the tree often reaches a height of 100 feet with a trunk diameter of 5 feet.

The scalelike leaves are 4-ranked, blue-green when young, spreading, and sometimes three-fourths of an inch long on vigorous new shoots. The dark blue berries are covered with a pale bloom and have a resinous, sweet flesh. This juniper is familiar on abandoned farms and ragged fencerows, becoming rusty brown in foliage that matches the stringy red bark during the winter.

This species is one of the most desirable of our native evergreens for ornamental planting, since it forms interesting, symmetrical specimens adapted to many types of gardens. Many ornamental varieties are known and widely used in landscape plantings. They are slow-growing but long-lived. In areas where this tree grows, it is often moved in from the wild as a tree for landscape planting about the home, but when using it in this manner, care should be taken to see that it is provided with a sunny spot. Eastern Red Cedar is also much used as a Christmas tree in some areas. In 1952 Department of Agriculture statistics showed that 10 percent of all Christmas trees used in the United States were of this species.

The earliest explorers of Virginia in 1564 did not fail to mention so handsome, so fragrant a tree as this one, and the early colonists from the start recognized its value, for of it, as Peattie (1950) remarks, they made "fences and shingles, benches and tables, coffins and the superstructures of boats. So easy was it to split with the frow and to smooth with the plane that it could be worked even by people as woefully ill-prepared for wilderness life" as were the first settlers of Virginia and Massachusetts. It was immediately a favorite wood for use in building log cabins and rail fences because of its endurance when exposed to the elements and its durability in contact with the soil.

Later the craftsmen of colonial Virginia employed it in the manufacture of bedsteads, secretaries, and virginals. "The fragrance of the wood and the showy contrast in color between the red heartwood and the creamy sapwood compensated, to the tastes of those days," continues Peattie, "for the fragility of the material." Sargent (1891-1902) thus summarizes its general usefulness at the turn of the century: "It is largely used for posts and railway ties, the sills of buildings and the interior finish of houses, and for lining closets and chests in which woollens are preserved against the attacks of moths; it is also employed in cabinet-making and almost exclusively in the manufacture of lead-pencils, while its lightness, durability, cheerful color, and pleasant fragrance recommend it to the makers of pails and tubs and many other small articles." "The straightest grained and most easily worked cedar wood," he continues, "is obtained from the swamps near the western coast of the Florida peninsula, and large factories have been established at Cedar Keys, Florida, and at other points



Juniperus virginiana--Eastern Red Cedar
 [From Sargent (1891-1902), Vol. X, Plate 524, p. 96.]

in the southern states, by German manufacturers, to cut up the wood for pencil-making." Eastern Red Cedar now finds employment chiefly in the linings for mothproof chests and closets. But, as one writer has observed, "How repellent the odor may be to moths is less certain than the psychological attraction it has for the careful housewife."

Cedar was the perfect wood for making pencils because of its lightness and the ease with which it could be sharpened, and for over a century this species supplied the world with millions, probably billions, of them. Only the clearest knot-free heartwood was used, however, and 70 percent of the bulk of every log cut for that purpose was wasted. Peattie reports that in 1900 some 3,000,000 feet of fine quality cedar was sent down the Cumberland river in great timber rafts. "But only ten years later cedar 'cruisers' had searched out the last virgin stands, lumbermen were working over the stumps of their previous destruction, and buyers were snapping up log cabins, barn floors, and even rail fences that had stood exposed to the weather for fifty years." The easterner was later spared his cedars only because the pencil industry transferred its affections to the Incense Cedar of the west.

Oil of cedar is an article of commerce obtained from the wood of Eastern Red Cedar by distillation of chips and waste wood. One authority reported that from 15,000 to 20,000 pounds of oil have been produced annually in the United States, 1 bushel of chips yielding about half a pint of oil. Hemmerly (1970) states that "Oil of red cedar is cheap and has a variety of uses as a component of cosmetics, perfumes, soap, and polishes. The chief raw material is old cedar stumps. The stumps are reduced to dust that is then steam-distilled and condensed, with the oil rising to the top. One company in Tennessee produces approximately 300 pounds daily." It was formerly one of the principal constituents of the popular Extract of White Rose. The oil is likewise used as a moth repellent and as an insecticide in sprays and dusts. Steyermark (1963) remarks also that because of its high index of refraction, the refined oil is used in oil immersion microscopes. A volatile oil derived from the leaves has also been used in perfumes.

The berries in decoction are diaphoretic and emmenagogue, and the leaves have diuretic properties. John Brickell in 1734 reported that "the Wood of this Tree is profitable against the French Pox [syphilis], and an infusion in Vinegar helps Scabs and other cutaneous disorders." Peter Kalm in 1749 was informed by the commander of Fort Frontenac that "red cedar and herbs, the medicinal value of which he praised most highly" grew abundantly near the fort. A century later Dr. Clapp reported the properties of our indigenous Red Cedar to be equivalent to those of sabina or savin, a drug used as a stimulant, diaphoretic, and a remedy for amenorrhea. He warned, however, that the oil derived from the wood was a narcotic, irritant poison that had caused several deaths in persons seeking by its use to induce abortion, causing vomiting, convulsions, coma, and death. Dr. Beach held that the oil distilled from the leaves and berries was useful in inflammatory rheumatism.

Aboriginal use of red cedar was widespread. Densmore (1928) reports that the bark of this species "was needed for parts of canoes and for numerous other uses," one of which was the making of mats. The inner bark

was also used in the preparation of a mahogany dye for coloring the strips of cedar bark used for their mats. The strips were boiled in a decoction made from the dark red inner bark. Vogel (1970) states that "The Teton-Dakotas used a decoction of the boiled fruit and leaves to fight the Asiatic cholera of 1849-50, reportedly with some effect. The same medicine was used by Plains tribes for coughs in both people and horses." The Dakotas, Omahas, Poncas, and Pawnees burned the twigs and inhaled the smoke for coughs and head colds and also used them in their vapor baths. The Kiowas extracted the juice of the berries by chewing and held the liquid in their mouths as a mild antiseptic rinse. Cedar fumes were used by the Creeks to drive away cramps in the muscles of the neck, and they drank a decoction of the berries for dysentery. Some Indian tribes crushed juniper berries and rubbed the oil on their skins as an insect repellent. The Natchez used cedar for pains in the shoulders and back, for swellings in the legs, and for mumps. The Alabamas boiled sprigs and leaves of cedar for warm applications to rheumatic pains. The Ojibwas used the bruised leaves and berries of red juniper internally to relieve headache, while the Meskwakis boiled the leaves for a drink used in weakness and for convalescent medicine.

Editors of the 12th edition of the U.S. Dispensatory (1865) compared the Eastern Red Cedar with the European Savin, the "former being like the latter, stimulant, emmenagogue, diuretic, and, under certain circumstances, diaphoretic," but it was thought to be "much less energetic," and, although it had been successfully used in the treatment of rheumatism and dropsy, it had "not acquired the confidence of the profession generally." Nevertheless, during the 1800's it acquired a reputation among the laity as being useful for a number of ailments. In Appalachia a mixture of seeds, leaves, and twigs was boiled and the steam inhaled as a treatment for bronchitis. In other areas a decoction of the leaves and fruit was used as a stimulant, to treat delayed menstruation, and to induce perspiration. Spanish-speaking New Mexicans have used a boiled mixture of bark and water to treat skin rash. The oil was also used, primarily as an external application in arthritic and rheumatic conditions. The young leafy twigs of this species were official in the U.S. Pharmacopeia, 1820-94, for use as a diuretic. Distilled cedar oil, as a reagent, has been official since 1916. Both leaves and berries are still in demand by companies processing plant products.

Well over 50 species of wild birds, headed by the handsome cedar waxwing (who takes his name from his fondness for the fruit of this tree), feed on the berry-like cones, particularly during the winter. Other species include the bobwhite, sharp-tailed grouse, pheasant, and mourning dove. The seeds pass unharmed through a bird's alimentary canal and are thus dispersed over the countryside. Even the opossum is not adverse to eating the cones of this species.

Kingsbury (1964) states that this and other species of juniper have the reputation in early old world literature of being toxic to stock, but they are eaten only under extreme duress, as farm animals find these plants extremely distasteful. They are listed in some of the earliest American publications on poisonous plants, but instances of loss of animal life are not well documented. These plants may possibly cause abortion,

but there is little danger of poisoning under today's skillful management of animal husbandry.

Thuja L. Arborvitae.

This is a genus of six species, one occurring in eastern North America, a second in the Pacific states, north to Alaska, and four in eastern Asia. They are evergreen trees with a very flat, 2-ranked spray consisting of small, closely imbricated, appressed, persistent leaves, giving the branches a frondlike appearance. The leaves are of two kinds, on different or successive branchlets, one stipulate, the other scalelike, blunt, short, and fused to the branch. When bruised, the branches of some species emit a characteristic odor rather like a mixture of Tansy and turpentine. The name of the genus was adopted by Linnaeus from the Thuva of Tournefort, which was the ancient name used by Theophrastus for some fragrant, resin-bearing evergreen tree. By some the name is derived from the Greek theos, signifying sacrifice, presumably because the resin procured from certain species was used as incense.

Arborvitae wood is used for construction, cabinet work, and cooperage; it is favored for purposes where great durability is required when wood must be exposed to weather changes. So resistant to decay is the timber of this tree that instances have been known of trees falling in the forest and remaining sound enough to be cut up and used for shingles after 400 years.

Several species are among the most decorative of evergreen trees, and, as they are hardy, they can be used in most parts of North America. Some of the species form good hedge plants and screens. When they are grown as decorative trees, very little pruning is necessary. When grown as hedges they can be sheared once or twice a year, but care should be taken not to cut back into wood more than one year old. There are numerous varieties with a dwarf habit which are excellent for rock gardens and foundation plantings, since they grow slowly and retain their compact form. Three oriental species are also often planted in this country as ornamentals.

T. orientalis, Oriental Arborvitae, was at one time placed in a separate genus, Biota, because it differs from other species in its fleshy cone scales and large seeds. Under natural conditions it may grow 50 to 60 feet high with spreading branches, but in cultivation it is usually seen as a compact, shapely tree only 20 to 30 feet high. It is not a very fast-growing tree, a useful characteristic where space is limited. It was cultivated in the Chelsea Physic garden in 1752 and was believed to have been sent to Europe by French missionaries. The leaves, which have a pungent aromatic odor, are said to yield a yellow dye. There are many varieties of this plant in cultivation, some of them being notable for their rich golden color.

T. plicata, the Giant Arborvitae, is a very handsome tree native to Western North America. It attains gigantic proportions in the forests along the Pacific slope, where it sometimes grows 200 feet high with a trunk 5 to 10 feet in diameter. It grows rapidly and its rich green

foliage is very attractive. When bruised, the leaves emit a characteristic tansy-like odor. In addition to its value as a decorative tree, it is also planted under forest conditions. The timber known as Western Red Cedar is the wood of this tree; it is exceedingly durable, ideal for shingles, siding, poles, posts, and mine props.

Thuja occidentalis L. Arborvitae.

Meaning of Species Name. Western, as contrasted with a tree of e Asia.

Other Names. Eastern Arborvitae, White Cedar, Northern White Cedar, False White Cedar, Feather-leaf Cedar, Vitae, Cedar, Swamp Cedar, Yellow Cedar, Tree-of-life, American Arborvitae, Western Arborvitae, Hackmatack, Atlantic Red Cedar, Eastern White Cedar, Michigan White Cedar, New Brunswick Cedar, Thuja, Western Thuja.

Type of Plant. A small tree growing 25-50 ft high with a trunk 1-2 ft in diameter.

Habitat. Swamps and cool rocky banks.

Range. Que to Sask, s to NJ, Pa, along the mts to NC and Tenn, Mich, Wis, and Minn, with outlying stations in O, Ind, and Ill.

Distr in NYS. Common northw; rare southw to Westchester, Putnam, and Orange co, westw to L Erie.

Distr in the Torrey Range. NY: Westchester (probably now extinct), Putnam, and Orange co, increasing northw.

Elevation. Grows to 3500 ft in the Adirondacks; sea level-1420 ft in the Torrey range.

Time of Fl. May-Jun; Apr 25-May 20 at Cornell.

Origin. Native.

Remarks. Often forms dense stands excluding other vegetation. Wood soft, brittle, weak, coarse-grained, light brown; wt 20 lb per cu ft.

Eastern Arborvitae is a tree of northern distribution, occurring in low swamps and along the banks of streams, often forming impenetrably thick rings around tamarack bogs. It has a densely pyramidal crown, and the lateral branches frequently are retained nearly to the base of the trunk, while the trunks themselves commonly divide into two or more secondary trunks. Its scalelike leaves are borne on flattened, frondlike branchlets, each leaf supporting a glove-shaped oil gland on the back. The cones are small and brown, its seeds occurring at the base of the scales. It is a long-lived tree, with a life expectancy of 200 to 300 years, but it may live longer.

The name Arborvitae, Latin for l'arbre de vie (tree of life), is said to have been given this tree by the king of France early in the 16th century. This species was probably the first American tree north of Mexico to be introduced into Europe, for it was taken back by Cartier, who encountered it on his voyage up the St. Lawrence in 1535-36. Arborvitae is the fourth candidate reputed to have been used to cure Cartier's men of scurvy, and it may well have been the actual species used (in spite of Millspaugh's statement that it was Black Spruce), for tradition has it that this tree was taken back to France as a token of gratitude. Morison (1978) concurs, adding that "Cartier ... dug up some young arborvitae which were successfully transplanted in the royal garden at Fontainebleau."

It was soon established in Europe and has been widely distributed by root cuttings produced by layering.

Although lumbermen of the North Woods shingled their cabins with Arborvitae because its wood "resists decay forever," they otherwise had little use for its remarkable qualities. Although it is weak as a beam, it is one of the toughest woods we have. A thin shaving from a carpenter's plane can be folded, laid on an anvil, and struck repeatedly with a hammer without breaking. Its wood is soft, yet it splits easily--a factor which the Indians were able to exploit, for they found it easy to work with their primitive tools. They could split it with a stone maul along the growth rings into very thin slats. Moreover, it is the lightest wood in the northeastern states, a virtue which the Indians took advantage of when making frames for their birch-bark canoes. The Indians had other uses for Arborvitae wood as well, for Lewis and Clark reported that Indians west of the Mississippi used it in the manufacture of bows, baskets, hats, cord, and roofing. It was likewise used as food.

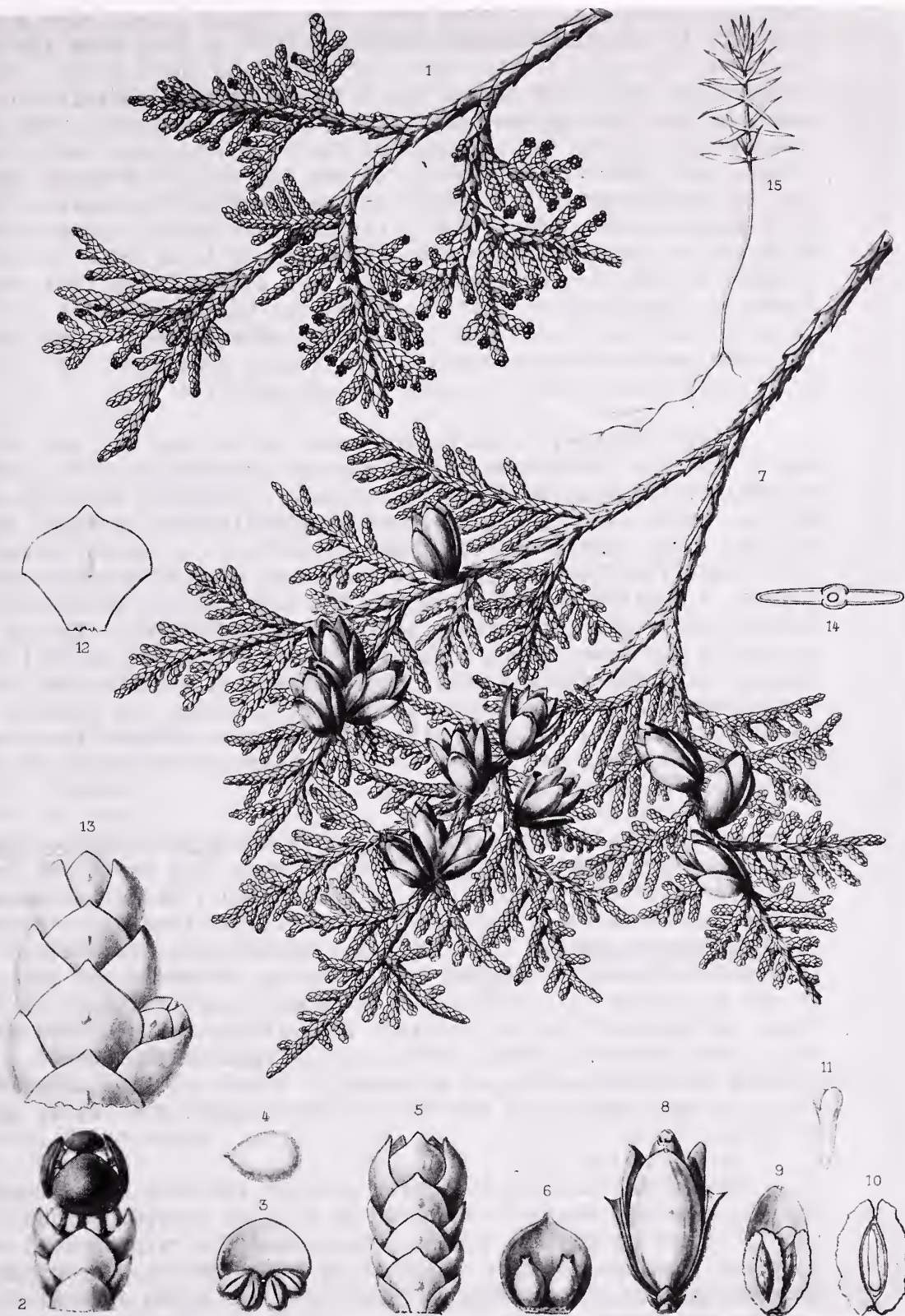
The wood of the Eastern Arborvitae is light, fragrant, and durable in contact with the soil, but soft, coarse, and brittle. In the north, where it is a common tree, it has been widely used for fence posts, as a light roofing timber, rails, boat and canoe construction, telephone poles, small articles of furniture, shingles, spools, boxes, and cups. Fence posts made from this tree are reported to last 35 to 40 years in clay soil. It has also been employed for making fire by friction, as the dry outer bark, finely shredded, makes good tinder. In former days its twigs were made into brooms, which at least had the virtue of emitting "an agreeable aromatic odor."

Of all our native evergreens, this species, of which there are many varieties, is one of the most attractive and most extensively used for ornamental purposes. In cultivation it is oftenest seen as an individual lawn or park tree, or in hedges on boundary lines. It submits comfortably to severe pruning, is easily transplanted, and comes readily from seed. Plantations grow rapidly into potential fence posts and telegraph poles.

The twigs and chips of wood, containing the familiar cedar oil, furnish a camp tea which some consider palatable, but not Thoreau. While on a canoe trip in Maine, Thoreau wrote, "This night we had a dish of arbor-vitae, or cedar-tea, which the lumberer sometimes uses when other herbs fail,--

'A quart of arbor-vitae
To make him strong and mighty.'

But I had no wish to repeat the experiment. It had too medicinal a taste for my palate." Its taste has been described as "somewhat between camphor and turpentine, with a bitterness all its own"; most people are therefore quite likely to be in full agreement with Thoreau. For those who may wish to experiment, a strong tea can be made by pouring a cup of boiling water over a teaspoonful of the chopped fresh foliage and letting it steep for 5 minutes. Large doses have caused spasms and convulsions, but few are likely to drink this bitter tea in excess.



Thuja occidentalis--Arborvitae
 [From Sargent (1891-1902), Vol. X, Plate 532, p. 128.]

Various parts of this tree were widely used by northern tribes for medicinal purposes. In some areas the crushed leaves were applied as a poultice in treating swollen hands and feet, or they were steeped in boiling water to apply to the chest for heart and chest pains. Other tribes bruised the twigs and leaves for a tea to promote perspiration, relieve headache, to "purify the blood," and as a cough remedy. One tribe used the burning leaves "as a smudge to revive unconscious patients," while others used them for incense or as one ingredient in their sweat baths. The women of another tribe steeped the inner bark to make a tea to promote menstruation. Core (1967) reports that Indian tribes of the southern Appalachians used the leaves and branches of *Arborvitae* "in treating coughs, fevers, catarrh, rheumatism, and scurvy." To treat convulsions Densmore (1928) states that the Chippewas burned the wood of this species to make charcoal, which was then "combined with bear's gall and pricked into the temples with needles." The leaves were also used, in combination with other ingredients, to make a cough medicine.

Early settlers soon became aware of the medical uses of this tree and during the 1800's eventually employed *arborvitae* leaves for a number of medicinal purposes. An ointment made by boiling fresh leaves in lard or bear grease was used as a local application for treating rheumatic complaints. The cones were sometimes ground into a powder, mixed with milk and four-fifths Rock Polypody leaves; this mixture was rubbed on rheumatic joints or applied as a poultice to the body (with a cloth over the skin to prevent excessive blistering) to treat violent pains. In the form of a decoction the leaves were also used to treat coughs, intermittent fever, dropsy, catarrh, gout, scurvy, rheumatism, and warts as well as to increase perspiration and urine flow. The distilled water was praised as a remedy in dropsy, and the volatile oil, which can be obtained from the leaves by distillation, has been used with success in the treatment of worms, but overdoses proved to be dangerous.

Arborvitae twigs were official in the U.S. Pharmacopeia, 1882-94, and in the National Formulary, 1916-36, when they were used as a stimulant, for diuretic purposes, as an emmenagogue, as an irritant, and to promote menstruation. The volatile, distilled leaf oil was official in the U.S. Pharmacopeia, 1942-50, for internal use. The action of the oil is similar to that of camphor, stimulating the heart and uterine muscles. It was also used as a stimulant, to promote menstruation, relieve rheumatism, and generally as an irritant and antiseptic. This volatile oil is toxic, and poisoning from overdoses has frequently occurred. This oil also entered the pharmacopeia as an aromatic substitute for lavender oil in soap liniment because of the wartime shortage of the latter produce in World War I.

Swamp thickets of this tree provide favorite wintering grounds for white-tailed deer in the north as well as providing these animals with palatable and nutritious browse. Moose and the varying hare also eat the twigs and foliage; cotton tail rabbits will even feed on ornamental specimens during the winter season. The seeds are eaten extensively by red squirrels and by such birds as the crossbills, the pine siskin, and some game birds, but value to other wildlife is slight.

LIST OF ABBREVIATIONS

The following abbreviations are used primarily in the "plant biographies" and in the Appendix, for the most part without periods:

adv, adventive	Jan, January
Afr, Africa, African	Jct, junction
Ak, Alaska	Jul, July
Ala, Alabama	Jun, June
alt, altitude	Kan, Kansas
Alta, Alberta	Ky, Kentucky
Am, America, American	L, lake
Apr, April	La, Louisiana
Ariz, Arizona	Lab, Labrador
Ark, Arkansas	lb, pound
Aug, August	LI, Long Island
Austr, Australia	m, meter
BC, British Columbia	Mack, Mackenzie District
BW, black-and-white photograph	Man, Manitoba
c, central	Mar, March
Cal, California	Mass, Massachusetts
cm, centimeter	Md, Maryland
Co, county, counties	Me, Maine
Col, Colorado	Mex, Mexico
Ct, Connecticut	Mich, Michigan
cu, cubic	Minn, Minnesota
cult, cultivation, cultivated	Miss, Mississippi
DC, District of Columbia	mm, millimeter
Dec, December	Mo, Missouri
Del, Delaware	Mont, Montana
distr, distribution	Mt(s), Mount, mountains
dm, decimeter	n, north, northern
e, east, eastern	NAm, North America(n)
eastw, eastward	natzd, naturalized
esc, escape, escaped	NB, New Brunswick
estab, established	NC, North Carolina
Eu, Europe	n.d., no date
Feb, February	ND, North Dakota
fl, flower, flowering	NE, New England
Fla, Florida	ne, northeast, northeastern
fr, fruit, fruiting	Neb, Nebraska
frag, fragmentary	Nev, Nevada
ft, foot	Nf, Newfoundland
Ga, Georgia	NH, New Hampshire
Gl, Greenland	NJ, New Jersey
I, island	NM, New Mexico
Ia, Iowa	n.n., no name
Id, Idaho	northw, northward
Ill, Illinois	Nov, November
in., inch	n.p., no place
Ind, Indiana	NS, Nova Scotia
introd, introduced	nw, northwest, northwestern

NY, New York
NYC, New York City
NYS, New York State
O, Ohio, Ohio State
University
Oct, October
Okla, Oklahoma
Ont, Ontario
Ore, Oregon
Pa, Pennsylvania
Phil, Philadelphia Acad-
emy of Sciences
Que, Quebec
R, river
reg, region, regions
RI, Rhode Island
Rt, route
s, south, southern
SAm, South America(n)
Sask, Saskatchewan
SC, South Carolina
SD, South Dakota
sec(s), section(s)
Sep, September
SI, Staten Island
southw, southward

southwestw, southwestward
ssp., subspecies
St, saint
sw, southwest, southwestern
T, transparency; i.e., a 35-mm
slide in color
Tenn, Tennessee
Tex, Texas
Trop, tropics, tropical
US, United States
Va, Virginia
var., variety
vic, vicinity
Vt, Vermont
w, west, western
Wash, Washington
westw, westward
WI, West Indies
Wis, Wisconsin
wt, weight
WVa, West Virginia
Wyo, Wyoming
x, a cross between two species, in-
dicating a hybrid
Yuk, Yukon Territory

GLOSSARY OF TECHNICAL TERMS

Unhappily for the amateur, botanical literature is so rife with technical terms that it almost seems necessary to learn a new language in order to be able to read some of it with any degree of comprehension. The writer has tried (but probably not always succeeded very well) not only to keep the use of technical terms to a minimum but also to define those he does use when they first occur. Since glossaries of botanical terms are readily available in most of the field guides, to say nothing of the two more comprehensive ones given in Fernald (1950) and in Gleason (1952), the writer has made no attempt to compile a glossary of botanical terms for this work. In any case, recourse can always be had to Webster's Seventh New Collegiate Dictionary (1965), where most of them are defined. Should one wish to go further afield, George Usher's (1966) A Dictionary of Botany is an excellent reference.

This work contains many references to the medicinal applications of plants, in the course of which the use of a number of medical terms has been necessary. Such words are perhaps likely to be even more unfamiliar to the layman than are those relating more or less strictly to botany. While the definitions of most of the medical terms are likewise given in the dictionary, the following list, compiled in part from Krochmal et al. (1971), may be helpful.

Ague, an old word for fever, usually malaria.
Allergenic, produces an allergy.
Alterative, changes a condition gradually
Amenorrhea, an abnormal absence or suppression of the menstrual discharge.
Anodyne, relieves or quiets pain.
Antacid, neutralizes excess acidity in the alimentary canal.
Anthelmintic, capable of expelling or destroying intestinal worms.
Antiasthmatic, relaxes bronchial muscles and relieves labored breathing.
Antidote, counteracts the action of a poison.
Antipruritic, prevents or relieves itching (antipsoriatic).
Antipyretic, reduces fever
Antiseptic, checks or inhibits the growth of microorganisms.
Antitussive, relieves or prevents coughing.
Aperient, an agent that gently moves the bowels.
Astringent, causes the contraction of tissue.
Ataxia, an inability to coordinate voluntary muscular movements.
Calculus, a mineral deposit or "stone," usually in the bladder or kidney.
Carcinogenic, causing cancer.
Carminative, used to relieve gas and colic.
Catarrhal, related to inflammation of the respiratory tract.
Cathartic, causes an evacuation of the bowel.
Caustic, destroys tissue.
Cholagogue, increases the flow of bile.
Consumption, an old term for tuberculosis.
Corroborant, an invigorating agent.
Counterirritant, causes irritation of the surface of an area with the object of relieving a deep-seated congestion.
Cystic, relating to the urinary bladder or to the gall bladder.

Cystitis, inflammation of the urinary bladder.
Cytotoxic, poisonous to cells.
Decoction, an extract obtained by boiling.
Demulcent, a substance used to protect or soothe the mucous membrane.
Depurative, removes impurities and waste materials from the blood.
Diaphoretic, used to increase perspiration.
Disinfectant, destroys or inhibits the growth of harmful microorganisms.
Diuretic, increases the volume of urine.
Drastic, an agent that acts rapidly or violently.
Dropsy, edema; i.e., an abnormal accumulation of serous fluid in bodily tissues (excess "water" in the common tongue).
Dysentery, a disease characterized by severe diarrhea with passage of mucus and blood, usually caused by infection.
Dyspepsia, a disturbed digestive condition characterized by nausea, gas, and heartburn.
Emetic, an agent that causes vomiting.
Emmenagogue, an agent that induces menstrual flow.
Emollient, used externally to soften the skin and protect it.
Excoriation, a peeling or wearing off of the skin.
Expectorant, an agent that causes expulsion of mucus from the respiratory tract.
Febrifuge, an agent that reduces fever.
Flatulence, stomach discomfort caused by gas.
Flux, an excessive abnormal discharge from the bowels.
Gastritis, inflammation of the mucous membrane, particularly of the stomach.
Hemoptysis, expectoration of blood from some part of the respiratory tract.
Hemorrhage, a copious discharge of blood from the blood vessels; bleeding.
Hemostatic, an agent used to stop internal hemorrhage.
Hepatic, of or pertaining to the liver.
Herpetetic, pertaining to reptiles.
Hypnotic, an agent that induces sleep without delirium.
Infusion, an extract obtained by steeping or soaking in water, usually hot but not boiling.
Irritant, causes inflammation of, or stimulation to, the tissues.
Lumbago, painful muscular rheumatism usually involving the lower back.
Menorrhagia, an abnormally profuse menstrual flow.
Ophthalmiatric, used in the treatment of eye diseases.
Pectoral, usually an expectorant, used for diseases of the chest and lungs.
Peritonitis, inflammation of the tissues lining the abdominal cavity.
Poultice, a soft, usually heated, medicinal substance spread on cloth and applied to the skin.
Pressor, raising or tending to raise blood pressure.
Pulmonary, pertaining to the lungs.
Purgative, increases peristalsis (contraction of the bowel).
Pustulant, causes severe irritation of the skin, especially the sweat glands.
Refrigerant, allays thirst and gives a sensation of coolness to the body.
Rickets, a childhood disease characterized by defective deposition and utilization of calcium and phosphorus owing to inadequate sunlight or vitamin D.
Rubifacient, causes reddening and mild irritation of the skin.
Scorbutic, relating to or resembling scurvy.

Scurvy, a disease marked by spongy gums, loosening of teeth, and bleeding into the skin and mucous membranes, resulting from a lack of ascorbic acid.

Sialagogue, causes an increase in flow of saliva.

Somnifacient, produces sleep without delirium; a soporific.

Soporific, tending to cause sleep.

Stomachic, stimulates appetite and increases secretion of digestive juices.

Styptic, an agent to check bleeding.

Sudorific, increases perspiration.

Taeniocide, an agent that destroys tapeworms.

Tincture, a solution of a medicinal substance in alcohol.

Tonic, stimulates the restoration of tone to the muscles.

Vasoconstrictor, narrows the passageways of the blood vessels.

Vermicide, an agent that destroys worms.

Vermifuge, a substance to destroy or expel parasitic worms.

Vesicant, causes irritation to the skin, resulting in blisters.

Vulnerary, an agent that promotes healing of open wounds.

BIBLIOGRAPHY

- Adrosko, Rita J. 1971. Natural Dyes and Home Dyeing. Dover Publications, Inc., New York.
- Alexander, E. J. 1936. "An Unsought Adventure in the Southern Catskills," Jour. N. Y. Bot. Gard, 37: 42-46.
- Arehart-Treichel, Joan. 1976. "Don't Let Toxic Chemicals Go to Your Head," Science News, Vol. 109, No. 14, p. 221.
- Bailey, L[iberty] H. 1949. Manual of Cultivated Plants, Rev. Ed. Macmillan Publishing Co., Inc., New York.
- Bartram, William. 1792. Travels Through North and South Carolina, Georgia, East and West Florida. A facsimile of the 1792 London ed. The Beehive Press, Savannah, 1973.
- Berglund, Berndt, and Clare E. Bolsby. 1971. The Edible Wild. Charles Scribner's Sons, New York.
- Britton, Nathaniel L. 1908. North American Trees. Henry Holt & Co., New York.
- _____, and Addison Brown. 1913. An Illustrated Flora of the Northern United States, Canada and the British Possessions ..., 2d ed. 3 vols. Charles Scribner's Sons, New York.
- Brooker, S. G., and R. C. Cooper. 1961. "New Zealand Medicinal Plants," Econ. Bot. 15: 1-10.
- Brooklyn Botanic Garden. 1964. Dye Plants and Dyeing. A special printing of Plants & Gardens, Vol. 20, No. 4. Brooklyn Botanic Garden, Brooklyn.
- Brooks, Karl L. 1962. "New Records for Delaware County, New York," Torrey 89: 190-191, May-June.
- _____. 1977. The Catskill Flora: A Check List. Privately Xeroxed.
- _____. 1978. A Check List of the Flora of Delaware County, New York. Privately Xeroxed.
- Brown, H. P. 1921. Trees of New York State. New York State College of Forestry at Syracuse University, Technical Publ. No 15. Syracuse, N. Y. Reprinted by Dover Publications, Inc., New York, 1975.
- Buchheister, J. C. 1903. "Notes from the Catskills [Griffins Corners, N. Y.]," The Fern Bul. 11: 15-16.
- Burns, G. P., and C. H. Otis. 1916. Trees of Vermont. Vermont Agric. Exp. Sta. Bul. 194. Free Press Printing Co., Burlington, Vt.

- Clute, Willard N. 1898. The Flora of the Upper Susquehanna and Its Tributaries. Willard N. Clute & Co., Binghamton, N. Y.
- Coon, Nelson. 1960. Using Wayside Plants, 3d rev. ed. Hearthside Press, Inc., New York.
- Core, Earl L. 1967. "Ethnobotany of the Southern Appalachian Aborigines," Econ. Bot. 21: 199-214.
- Densmore, Frances. 1928. "Uses of Plants by the Chippewa Indians," 44th Annual Report of the Bureau of American Ethnology to the Secretary of the Smithsonian Institution, 1926-1927, pp. 279-397. U. S. Government Printing Office, Washington, D. C. Reprinted as How Indians Use Wild Plants by Dover Publications, Inc., New York, 1974.
- Dispensary of the United States of America, 12th ed. 1875. J. B. Lippincott & Co., Philadelphia.
- Emerson, George B. 1878. A Report on the Trees and Shrubs Growing Naturally in the Forests of Massachusetts. 2 vols. Little, Brown, & Co., Boston.
- Encyclopaedia Britannica. 1957. 24 vols. Encyclopaedia Britannica, Inc., Chicago.
- Everett, T. H., ed. 1960. New Illustrated Encyclopedia of Gardening, Unabridged. 14 vols. Greystone Press, New York.
- Fernald, Merritt L. 1950. Gray's Manual of Botany, 8th ed. American Book Co., New York.
- Fernald, Merritt L., and Alfred C. Kinsey. 1943. Edible Wild Plants of Eastern North America. Idlewild Press, Cornwall-on-Hudson, N. Y. (An edition revised in 1958 by Reed C. Rollins is available from Harper & Row, New York.)
- Gaertner, Erika E. 1970. "Breadstuff from Fir (Abies balsamea)," Econ. Bot. 24: 69-72.
- Gleason, Henry A. 1952. The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada. 3 vols. The New York Botanical Garden, New York.
- Grieve, M. 1967. A Modern Herbal. 2 vols. Hafner Publishing Co., New York.
- Grimm, William C. 1962. The Book of Trees. The Stackpole Co., Harrisburg, Pa.
- _____. 1966. Recognizing Native Shrubs. The Stackpole Co., Harrisburg, Pa.
- _____. 1967. Familiar Trees of America. Harper & Row, Publishers, New York.

- Harlow, William M. 1957. Trees of the Eastern and Central United States and Canada. Dover Publications, Inc., New York.
- Hedrick, U. P. ed. 1919. Sturtevant's Edible Plants of the World. Dover Publications, Inc., New York, 1972.
- Hemmerly, Thomas E. 1970. "Economic Uses of Eastern Red Cedar," Econ. Bot. 24: 39-41.
- House, Homer D. 1924. Annotated List of the Ferns and Flowering Plants of New York State. New York State Museum Bul. No. 254.
- Illick, J. S. 1914. Pennsylvania Trees. Commonwealth of Pennsylvania, Department of Forestry Bul. No. 11. Wm. Stanley Ray, State Printer, Harrisburg, Pa.
- Johnson, C. Pierpoint. [1867.] The Useful Plants of Great Britain. Robert Hardwicke, London.
- Johnston, Alex. 1970. "Blackfoot Utilization of the Flora of the Northwestern Great Plains," Econ. Bot. 24: 301-324.
- Kingsbury, John M. 1964. Poisonous Plants of the United States and Canada. Prentice-Hall, Englewood Cliffs, N. J.
- Krochmal, Arnold. 1968. "Medicinal Plants and Appalachia," Econ. Bot. 22: 332-337.
- _____, and Connie Krochmal. 1973. A Guide to the Medicinal Plants of the United States. Quadrangle, the New York Times Book Co., New York.
- _____, Russell S. Walters, and Richard M. Doughty. 1971. A Guide to Medicinal Plants of Appalachia. Agriculture Handbook No. 400, Forest Service, U. S. Department of Agriculture.
- Kudish, Michael. 1971. Vegetational History of the Catskill High Peaks. University Microfilms, Ann Arbor, Mich.
- Lawrence, George H. M. 1951. Taxonomy of Vascular Plants. The Macmillan Co., New York.
- Li, Hui-Lin. 1969. "The Vegetables of Ancient China," Econ. Bot. 23: 253-260.
- Lighthall, J. I. [n.d.] The Indian Folk Medicine Guide. Popular Library, New York.
- Loudon, John C. 1844. Arboretum et Fruticetum Britannicum. 8 vols. Printed for the author by Longman, Brown, Green & Longmans, London.
- McVaugh, Rogers. 1958. Flora of the Columbia County Area, New York. New York State Museum and Science Service Bul. No. 360.

- Martin, Alexander C., Herbert S. Zim, and Arnold L. Nelson. 1961. American Wildlife and Plants. Dover Publications, Inc., New York.
- Medsger, Oliver P. 1917. "Two Months in the Southern Catskills," Mem. Torr. Bot. Club 17: 294-300.
- _____. 1927. [Flora of the Catskills--Abstract of a lecture before the Torrey Botanical Club 9 Nov 26] Torrey 27: 13-14.
- _____. 1947. Edible Wild Plants. The Macmillan Co., New York.
- Michaux, F[rançois] Andrew. 1851. The North American Silva ... 3 vols. Robert P. Smith, Philadelphia; G. P. Putnam, New York. First published in Paris, 1810-13.
- Millspaugh, Charles F. 1887. American Medicinal Plants ... Boericke & Tafel, New York & Philadelphia.
- _____, Charles F. 1892. Medicinal Plants. John C. Yorston & Co., Philadelphia.
- Mohlenbrock, Robert H., and Dan K. Evans. 1974. "Illinois Field and Herbarium Studies," Rhodora 76: 460-470.
- Morison, Samuel Eliot. 1978. The Great Explorers: The European Discovery of America. Oxford University Press, New York.
- Muenschner, Walter C. 1949. Poisonous Plants of the United States. The Macmillan Co., New York.
- _____. 1950. Keys to Woody Plants, 6th rev. ed. Comstock Publishing Co., Inc., Ithaca, N. Y.
- Parker, Arthur C. 1910. Iroquois Uses of Maise and Other Food Plants. New York State Museum Bul. No. 482. Albany, N. Y.
- Peattie, Donald C. 1950. A Natural History of Trees of Eastern and Central North America. Houghton Mifflin Co., Boston.
- Perkins, Anne E. 1930. "Common Plants as Domestic Remedies in Maine," Torrey 30: 63-68.
- Petrides, George A. 1958. A Field Guide to Trees and Shrubs. The Peterson Field Guide Series. Houghton Mifflin Co., Boston.
- Platt, M. "Plants Collected and Examined by the Botanic Class ... During the Summer Term of 1840," Fifty-fourth Annual Report of the Regents of the University of the State of New York, 227-231, 1841.
- Proctor, George R. 1947. "Some Noteworthy Catskill Plants," Rhodora 49: 53-54.
- Rafinesque, C[onstantine] S[amuel]. 1828-30. Medical Flora ... of the United States ... 2 vols. Atkinson & Alexander, Philadelphia.

- Rogers, Julia E. 1926. Trees. Doubleday, Page & Co. for Nelson Doubleday, Inc., New York.
- Sargent, Charles S. 1891-1902. The Silva of North America ... Exclusive of Mexico. 14 vols. Houghton, Mifflin & Co., Boston & New York.
- Steyermark, Julian A. 1963. Flora of Missouri. Iowa State University Press, Ames, Ia.
- Stone, Hugh E. 1945. A Flora of Chester County Pennsylvania. 2 vols. The Academy of Natural Sciences, Philadelphia.
- Sturtevant, Edward L. 1919. See Hedrick, U. P., ed. 1919.
- Svenson, H. K. 1931. "Trip of August 22-29," *Torreyana* 31: 154-157.
- Taylor, Norman. 1909. "The Botanical Symposium at Stamford, Delaware County, July 3-10, 1909," *Torreyana* 9: 188-189.
- _____. 1915. Flora of the Vicinity of New York: A Contribution to Plant Geography. Memoirs of the New York Botanical Garden, Vol. V.
- Torrey, Raymond H. 1930. "Columbus Day Week-End in the Catskills," *Torreyana* 30: 24-25.
- _____. 1931. "Catskill Trip, May 30-31," *Torreyana* 31: 121-123.
- U. S. Department of Agriculture. 1949. Trees: the Yearbook of Agriculture. U. S. Government Printing Office, Washington, D. C.
- _____, Agricultural Research Service. 1971. Common Weeds of the United States. Dover Publications, Inc., New York.
- Usher, George. 1966. A Dictionary of Botany. Constable & Co., Ltd., London.
- Vogel, Virgil J. 1970. American Indian Medicine. Ballantine Books, New York.
- Webster's Seventh New Collegiate Dictionary. 1965. G. C. Merriam Co., Springfield, Mass.
- Weiner, Michael A. 1972. Earth Medicine--Earth Foods: Plant Remedies, Drugs, and Natural Foods of the North American Indians. The Macmillan Co., New York.
- Wiegand, Karl M., and Arthur J. Eames. 1925. The Flora of the Cayuga Lake Basin, New York. Vascular Plants. Cornell University Agricultural Experiment Station, Memoir 92.
- Wiley, Farida. 1936. "Catskills Trip, September 12-14," *Torreyana* 36: 152-154.

APPENDIX

To collect specimens of the more than 1000 plants growing in each of the several townships in the Catskills would not only entail an enormous amount of work but would at the same time clutter up the herbarium with hundreds of specimens of very common plants. Taking a cue from the work of Homer D. House and Stanley J. Smith, both of whom have supplemented collections with observations in compiling distribution records for the State of New York, the writer for many years has made an effort to collect one specimen of each plant growing in the Catskills, supplementing these records with observations made in the field, listing all specimens identified at each locality on any given date.

The fly in this ointment, of course, is that the observer must know what he is looking at. When not sure of the identity of any given plant in the field, a specimen was collected to key out at home. In due course, these field observations were listed in manual sequence by place and date, then transferred to 4-by-6-inch file cards under the name of the species, eliminating duplicate observations made on previous visits at or near the same place. These records are supplemented by a picture file, both of colored slides and of black-and-white photographs, built up over the years. The result totals thousands of records from each county in the Catskills, many from different places in the same township. It was therefore necessary to devise some method to reduce the bulk of these records while still giving a fairly comprehensive view of the distribution of the various species in the Catskills.

Some scientific studies of plant distribution are made on grid plots of equal size and shape. While not strictly accurate from the scientific point of view, the township boundaries in each county do effectively break up the area into a grid. Following a device used by a number of other writers faced with a similar problem, it was therefore decided to use the township grid as a basis for the distribution maps that follow, the selection of records being based on the following criteria:

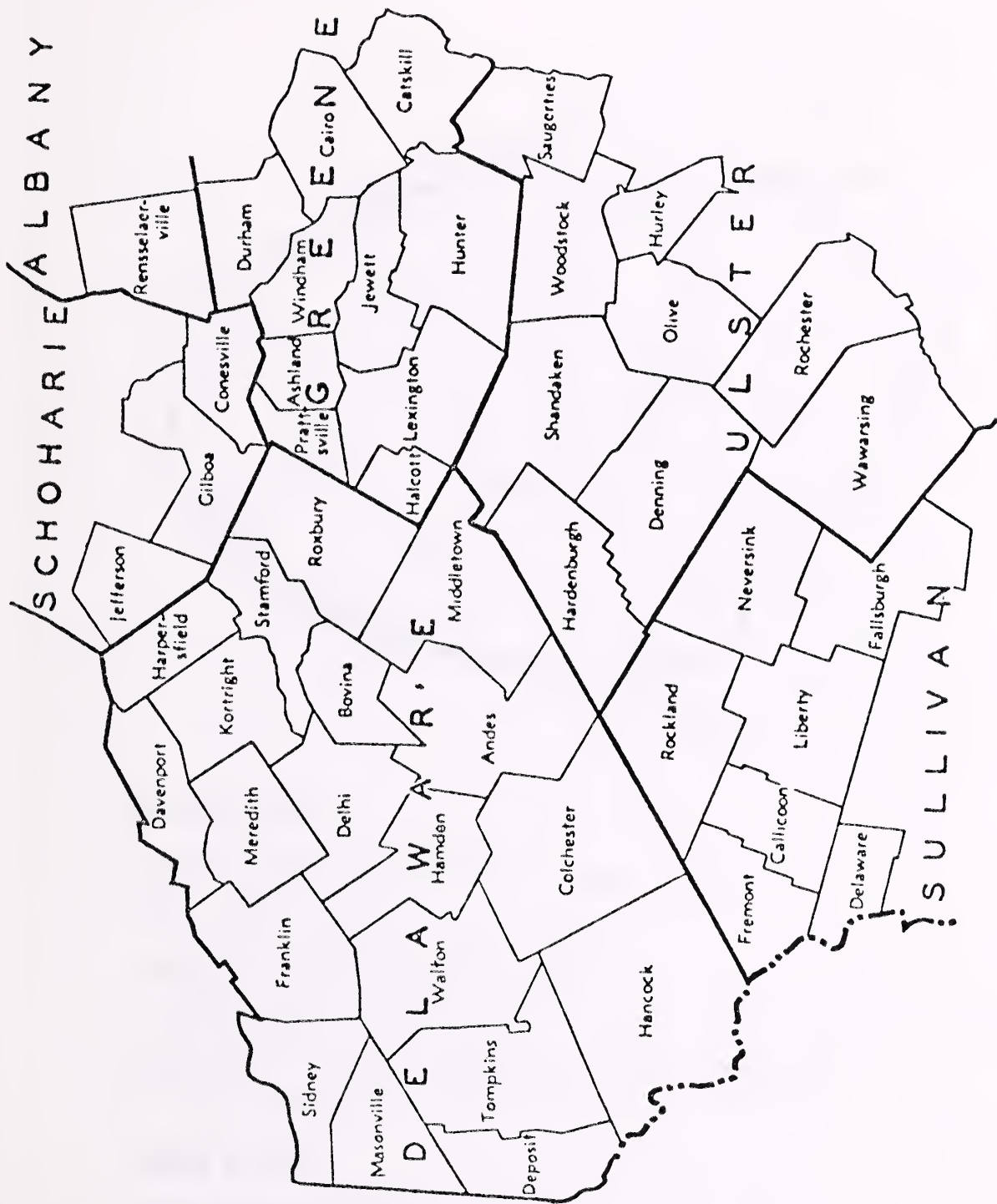
1. All specimens collected in the Catskills have been listed, even when two or more came from the same township.
2. All known references in the literature have been included.
3. In the absence of specimens, with few exceptions, only the earliest observation for each township is given, regardless of the number of observations at hand for that area.
4. Records are arranged in chronological sequence by county.
5. In selecting the records for each township, collections take precedence; when no collection records are available, photographs take precedence over observations as representing more objective evidence of the occurrence of the species in that area.
6. Owing to the uncertain status of species on the Platt list, subsequent records for the Town of Franklin in Delaware County are also listed as confirmation of the fact that the species occurs in that township.

On the distribution maps that follow, a solid dot (●) represents a collection made in that township, while an open circle (o) represents an observation, a reference in the literature, or a photograph taken by the writer, with "T" indicating a transparency in color and "BW" a black-and-white picture. No effort has been made to show the approximate location within the township of collections or observations; the solid dots and open circles simply indicate the occurrence of that taxon somewhere within the township.

In most instances a specimen has been collected as conclusive evidence that a particular species occurs in each county. Specimens of all critical taxa collected by the writer have been checked by the late Stanley J. Smith ("SJS" in the records that follow), curator of botany at the New York State Museum in Albany, and specimens have been deposited with that institution.

The herbaria where specimens from the Catskill region are filed are indicated in the distribution records as follows: (BKL) Brooklyn Botanic Garden; (Brooks) herbarium of the writer; (CU) Cornell University; (MIN) University of Minnesota; (NY) New York Botanical Garden; (NYS) New York State Museum; (O) Ohio State University; (PENN) University of Pennsylvania; (Phil) Philadelphia Academy of Sciences; (US) U. S. National Herbarium.

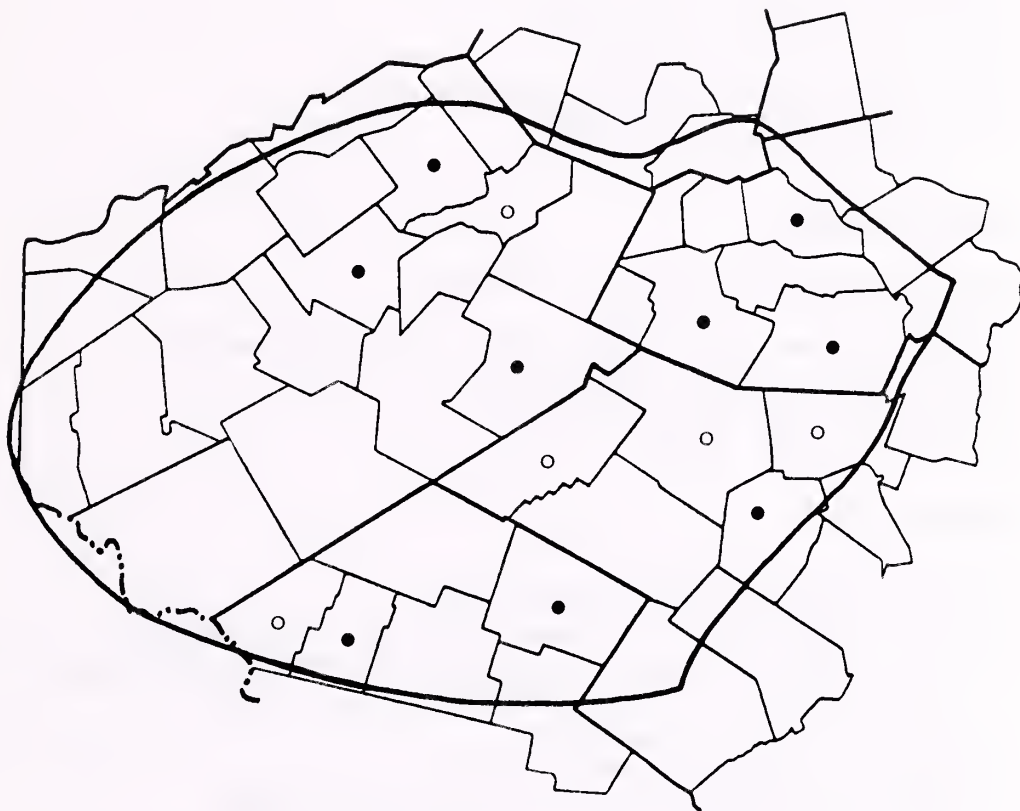
The eventual aim is to secure at least one specimen or an observation of each species occurring in each of the several townships comprising the Catskill region--an almost never-ending task. But from these records one can easily compile a check list for any particular township. It is hoped that such information may stimulate further research and add to our knowledge of the local distribution of plants in the Catskill region. During the last century it was the fashion among amateur botanists to compile floras or check lists for their local townships, work that contributed a more intimate knowledge of the plants growing in the area covered. There is still need for such studies. In addition to extending our scientific knowledge concerning the distribution of plants, such a project will not only result in a deeper understanding of the natural world but also provide many hours of intense satisfaction.



Counties and townships of the Catskill mountain region.

Taxus baccata L.
ssp. *canadensis* (Marsh.) Pilger
American Yew

Flora of
THE CATSKILLS
New York State



Delaware County

Arkville, Town of Middletown

P. Wilson 5 Jul 15 & 25 Jul 15--NY

Delhi, Town of Delhi

2026 N. Hotchkiss 9 May 27--NYS

Robinson L, w of Delhi, Town of Delhi

4488 E. Whitney 26 Jul 35--NYS

Brookdale Farm, 3 mi s by w of W. Harpersfield, Town of Kortright

3324 Brooks 5 Sep 54--Brooks

Post Place, 2 1/2 mi s of Stamford, Town of Stamford

KLB & Elisabeth Post obs 11 Sep 78

Greene County

Hunter, Town of Hunter

J. H. Redfield 20 Aug 1869--NY

Onteora, Town of Hunter

Anna M. Vail Jul 1891--NY

Taxus baccata ssp. *canadensis*

Blackhead Mt, Town of Windham

G. V. Nash at 3500 ft 2 Jul 1893--NY

Kaaterskill, Town of Hunter

E. A. Mearns 8 Aug 1896--NY

Tannersville, Town of Hunter

282 N. Taylor at 1864 ft 1 Jun 09--NY

Elk[a?] Park, Town of Hunter

W. L. Bray Jul 14--Syracuse

Haines Falls, Town of Hunter

W. C. Ferguson at 3800 ft 1 Jul 19--NY

Sprucetown, Town of Lexington

D. B. Cook 10 May 35--NYS

Sullivan County

Vic of L Shandelelee, Town of Callicoon

P. Wilson 8 Aug 18--NY

Fir Brook Swamp, vic of Willowemoc, Town of Neversink

8258 S. J. Smith 5 Aug 50--NYS

Ne of Long Eddy, Town of Fremont

SJS obs 20-22 Jun 56

Ulster County

High Peak, Town of Olive

J. F. Poggenburg 3 Aug 1895--BKL

Woodland Valley, 4 mi e of Phoenicia, Town of Shandaken

O. P. Medsger in Mem. Torr. Bot. Club 17: 294-300, 1917; E. J. Alexander in Jour. N. Y. Bot. Gard. 37: 42-46, 1936.

Overlook Mt, Town of Woodstock

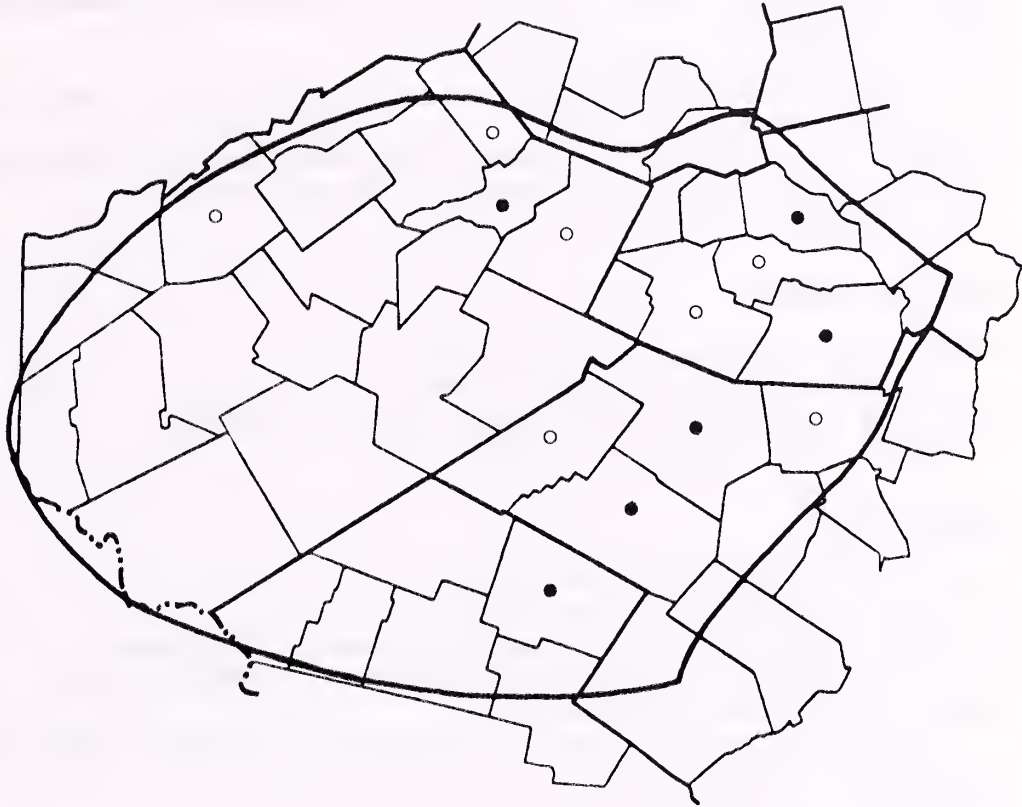
KLB & Mary Domville obs 12 Jul 70

5 1/2 mi se of Margaretville, Town of Hardenburgh

KLB obs 4 Sep 72

Abies balsamea (L.) Mill.
Balsam Fir

Flora of
THE CATSKILLS
New York State



Delaware County

The Vlai, 1 1/2 mi s of Oneonta, Town of Franklin
W. N. Clute in Flora Upper Susquehanna, p. 102, 1898.
Stamford, Town of Stamford
371 N. Taylor 3 Jun 09 at 1800 ft--NY
Vic of W. Harpersfield, Town of Harpersfield
Smith & DeGroot obs 20 Sep 63
Plattekill Mt, Town of Roxbury
Kudish (1971), p. 161.

Greene County

Hunter Mt, Town of Hunter
E. A. Mearns at 3100-4200 ft 27 Aug 1896--NY; H. K. Svenson obs 24
Aug 31 in Torreyia 31: 154-157, 1931.
Tannersville, Town of Hunter
379 N. Taylor at 1864 ft 1 Jun 09--NY

Abies balsamea

Windham, Town of Windham

895 & 896 N. Taylor at 1700 ft 28-31 Jul 09--NY

High Peak, vic of Haines Falls, Town of Hunter

W. C. Ferguson at 3800 ft 1 Jul 19--NY

Black Dome, Town of Jewett

Kudish (1971), p. 170

Windham High Peak, Burnt Knob, Acra Pt, Blackhead & Thomas Cole mts,
Town of Windham

Kudish (1971), pp. 161, 170.

North Dome, Sherrill, Evergreen, Rusk & West Kill mts, Town of Lexington

Kudish (1971), pp. 161, 171.

Stoppels Pt, North Mt, Kaaterskill High Peak, Roundtop, Indian Head,
Twin, Sugarloaf, Plateau & Hunter mts, Town of Hunter

Kudish (1971), pp. 161, 170, 171.

Sullivan County

Vic of Neversink, Town of Neversink

5 G. L. Stebbins Jr. 23 Jun 34 -NY

Fir Brook Swamp, vic of Willowemoc, Town of Neversink

8259 S. J. Smith 5 Oct 50--NYS

Ulster County

Vic of Bull Run, Town of Denning

2507 C. J. Elting 17 May 1899--NYS

Woodland Valley, 4 mi e of Phoenicia, Town of Shandaken

O. P. Medsger in Mem. Torr. Bot. Club 17: 294-300, 1917.

Overlook Mt, Town of Woodstock

H. K. Svenson obs 27 Aug 31 in *Torreya* 31: 154-157, 1931; Kudish (1971), p. 161.

Slide Mt, Town of Shandaken

4 G. L. Stebbins Jr. 26 Jun 34--NYS; E. J. Alexander in Jour. N. Y. Bot. Gard. 37: 42-46, 1936; summit of Slide Mt, SJS obs 8 Jun 54

Doubletop Mt, Town of Denning

Gilly & Camp 26 Jul 41--NYS

Watson Hollow, Town of Denning

H. Dunbar obs in Torr. Club Bul. 84: 57, 1957.

Schoolhouse Mt, Town of Denning

Kudish (1971), pp. 162, 170.

Slide, Panther, Fir, Big Indian, Hemlock, Spruce, Balsam Cap, Friday,
Wittenberg & Cornell mts, Town of Shandaken

Kudish (1971), pp. 161, 170.

Doubletop, Balsam Lake, Balsam, Eagle, Haynes & Graham mts, Town of
Hardenburgh

Kudish (1971), pp. 161, 162, 170.

Abies magnifica A. Murr.

Red Fir

Flora of
THE CATSKILLS
New York State

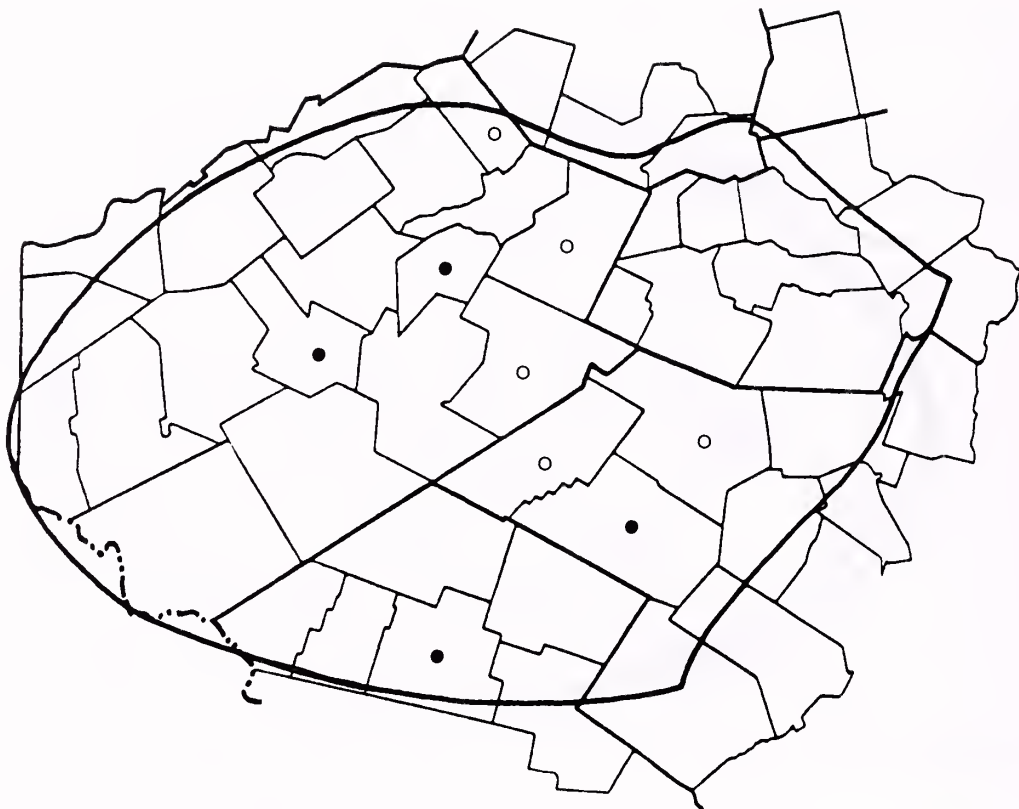


Ulster County

Huth Place, 1 1/2 mi s of Pine Hill, Town of Shandaken
511 M. Domville 22 Sep 68--NYS, Domville

Larix laricina (DuRoi) K. Koch
American Larch

Flora of
THE CATSKILLS
New York State



Delaware County

Vic of W. Harpersfield, Town of Harpersfield

SJS and DeGroot obs 20 Sep 63

3 mi se of Delancey at 1800 ft, Town of Hamden

6060 Brooks 16 Aug 74--NYS

Vic of Fleischmanns, Town of Middletown

KLB obs 11 Sep 75

Coulter Brook at 2000 ft, 2 mi s of Bovina Center, Town of Bovina

6102 Brooks 2 Jun 75--NYS, Brooks (*Larix* x *pendula* Salisb.)

Wake Robin, vic of Roxbury, Town of Roxbury

Phil Caswell obs, personal communication 10 Dec 78

Sullivan County

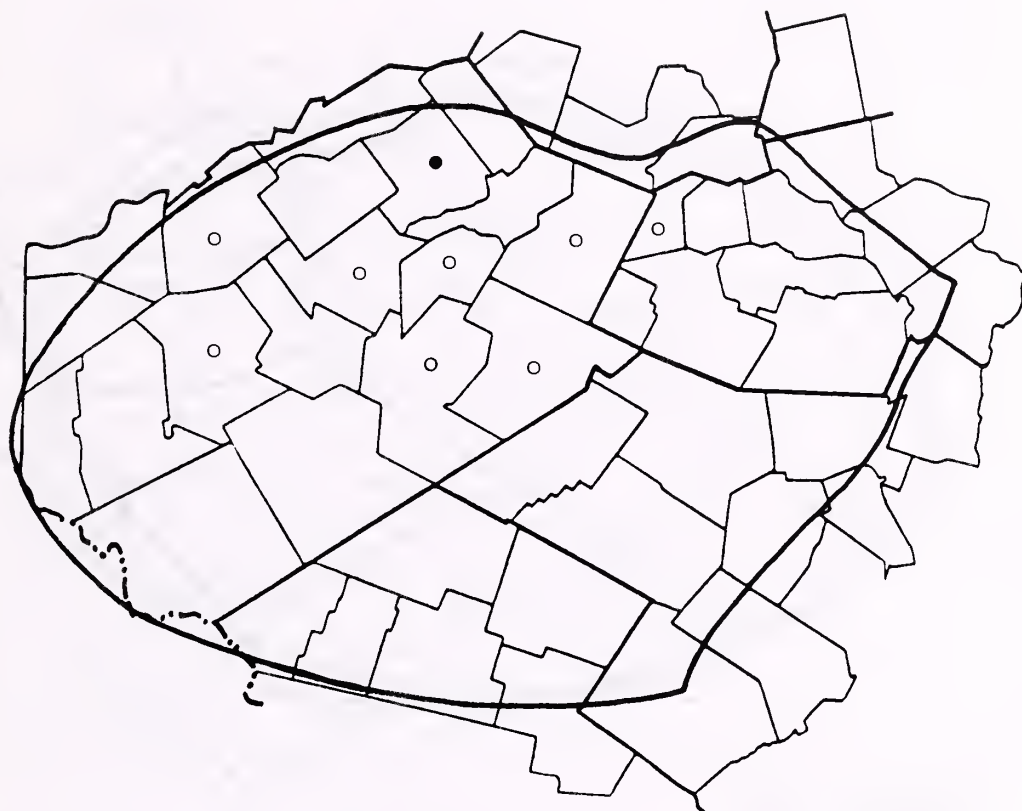
Vic of Liberty, Town of Liberty

Leggett [n.d.]--NYS (apparently *L.* x *alaskensis*)

(Continued on p. 99)

Picea abies (L.) Karst.
Norway Spruce

Flora of
THE CATSKILLS
New York State



Delaware County

Brookdale Farm, 3 mi s by w of W. Harpersfield, Town of Kortright
4055 Brooks 13 May 56--NYS, Brooks

Vic of Delhi, Town of Delhi

KLB obs 27 Apr 75

4 mi s of Andes, Town of Andes

KLB obs 11 May 75

4 mi ne of Walton, Town of Walton

KLB obs 30 May 76

2 mi se of Bovina, Town of Bovina

KLB obs 4 Jun 76

3 mi s of Treadwell, Town of Franklin

KLB obs 15 Sep 76

Wake Robin, vic of Roxbury, Town of Roxbury

Phil Caswell obs, personal communication 26 Sep 77

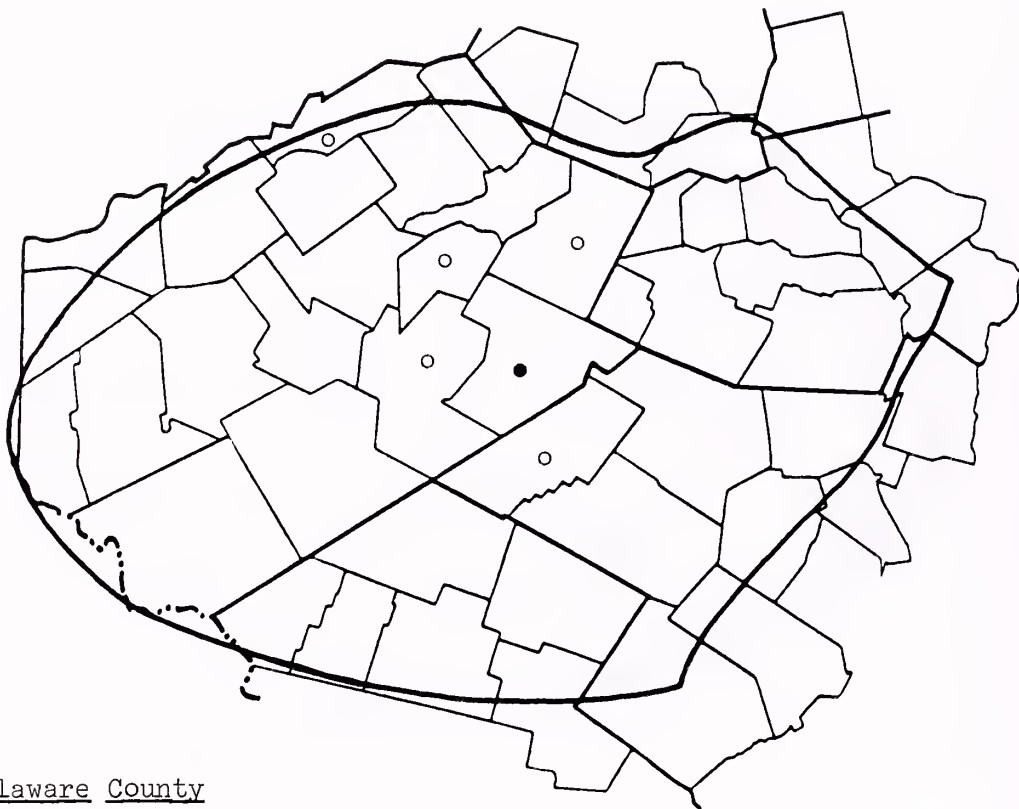
Arkville, Town of Middletown

KLB obs 17 Aug 78

(Continued on p. 104)

Picea glauca (Moench) Voss.
White Spruce

Flora of
THE CATSKILLS
New York State



Delaware County

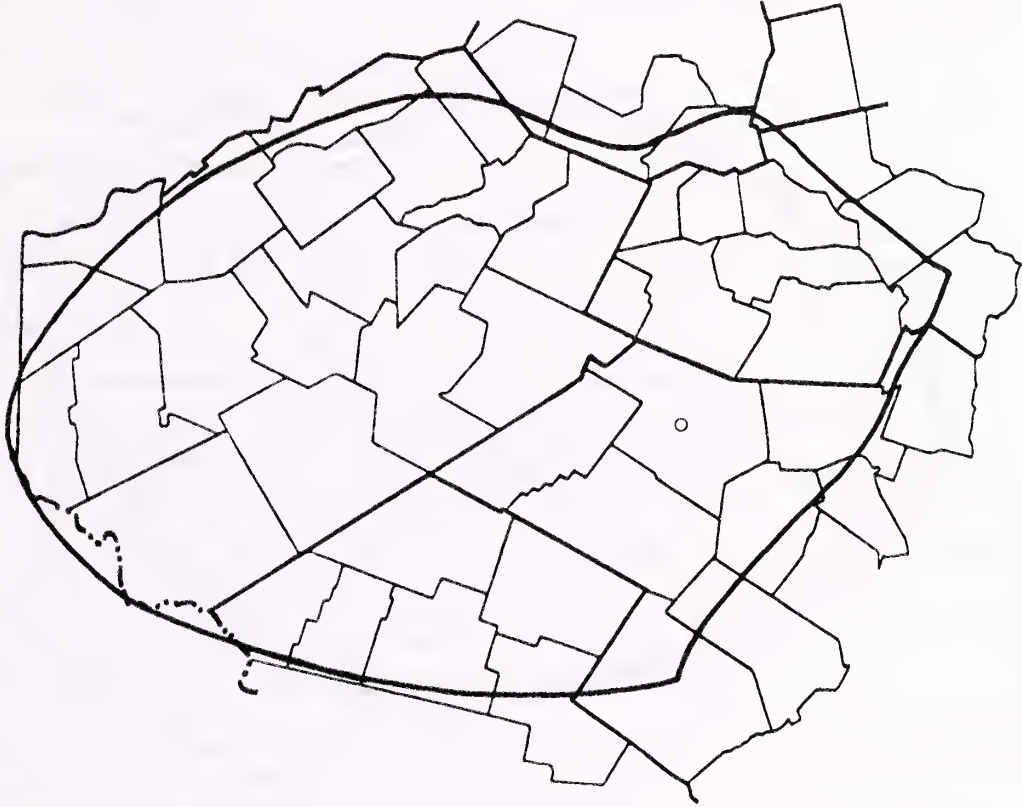
Old Stone Schoolhouse, 2 1/2 mi s of Margaretville, Town of Middletown
5012 Brooks 30 May 71--NYS, Brooks
Big Pond Rd, 14 mi s by e of Andes, Town of Andes
KLB obs 6 Jun 73 (specimen checked)
3 1/2 mi n by e of Bovina Center, Town of Bovina
KLB obs 24 Jun 74 (specimen checked)
Vic of Roxbury, Town of Roxbury
Phil Caswell obs, personal communication 26 Sep 77
3/4 mi s by w of Davenport Center, Town of Davenport
KLB obs 5 Sep 78

Ulster County

Rider Hollow, 2 mi e of Dry Brook, Town of Hardenburgh
KLB obs 7 Jun 75 (specimen checked; probably spread from cult)

Picea mariana (Mill.) BSP.
Black Spruce

Flora of
THE CATSKILLS
New York State

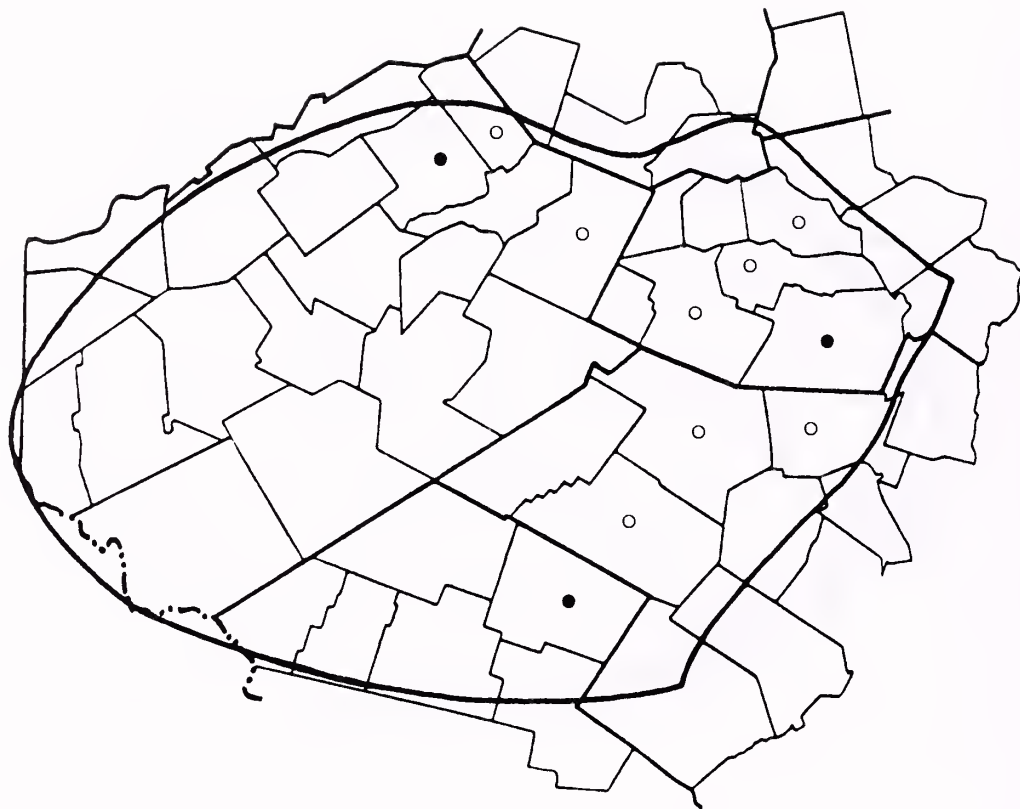


Ulster County

Woodland Valley, $\frac{1}{4}$ mi e of Phoenicia, Town of Shandaken
O. P. Medsger in Mem. Torr. Bot. Club 17: 294-300, 1917.

Picea rubens Sarg.
Red Spruce

Flora of
THE CATSKILLS
New York State



Delaware County

Doonans Corners, Town of Kortright
4360 Brooks 9 Jul 58--Brooks, NYS
Vic of W. Harpersfield, Town of Harpersfield
Smith & DeGroot obs 20 Sep 63
Plattekill Mt, Town of Roxbury
Kudish (1971), p. 155.

Greene County

Kaaterskill Jct, Town of Hunter
E. A. Mearns 12 Aug 1896--NY
Vic of Hunter, Town of Hunter
N. L. Britton 30 Jul-1 Aug 1898--NY
Tannersville, Town of Hunter
N. Taylor at 1864 ft 1 Jun 09--NY
Hunter Mt, Town of Hunter
H. K. Svenson obs 24 Aug 31 in *Torreya* 31: 154-157, 1931.

Picea rubens

Big Hollow [Maplecrest] on Batavia Kill, Windham High Peak, Burnt Knob, Acra Pt, Thomas Cole & Blackhead mts, Town of Windham

Kudish (1971), pp. 155, 161, 170.

Colgate L on East Kill, Town of Jewett

Kudish (1971), p. 159.

Platte Cove, Elka Park, Kaaterskill High Peak, Roundtop, North Mt, Stop-pels Pt, Indian Head, Twin, Sugarloaf, Plateau & Hunter mts, Town of Hunter

Kudish (1971), pp. 155, 171.

West Kill & Rusk mts, Town of Lexington

Kudish (1971), pp. 155, 156, 171.

Sullivan County

Fir Brook Swamp, vic of Willowemoc, Town of Neversink

8260 S. J. Smith 5 Oct 50--NYS

Ulster County

Woodland Valley, 4 mi e of Phoenicia, Town of Shandaken

O. P. Medsger in Mem. Torr. Bot. Club 17: 294-300, 1917.

Vic of Wittenberg & Slide mts, Town of Shandaken

A. H. Graves quoting O. P. Medsger in Torreyia 27: 13-14, 1927.

Overlook Mt, Town of Woodstock

H. K. Svenson obs 27 Aug 31 in Torreyia 31: 154-157, 1931; Kudish (1971), p. 155.

Headwaters of Rondout Creek, Town of Denning

SJS obs 12 Sep 59

Peekamoose, Table, Lone & Rocky mts, Town of Denning

Kudish (1971), p. 155.

Balsam Cap, Slide, Panther, Giant Ledge, Friday, Cornell & Wittenberg mts, Town of Shandaken

Kudish (1971), pp. 155, 170.

Larix laricina (continued from p. 94)

Ulster County

Town of Denning

855 H. Dunbar 10 Jun 55--NYS

Rider Hollow, 2 mi e of Dry Brook, Town of Hardenburgh

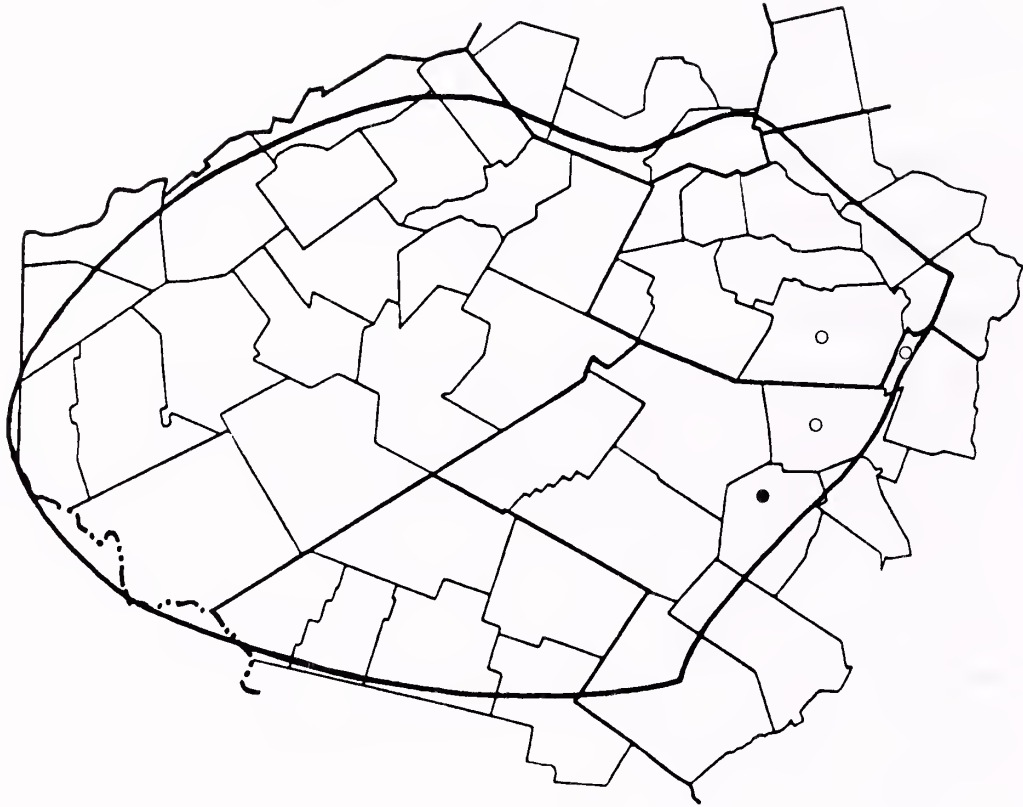
KLB obs 7 Jun 75

Vic of Pine Hill, Town of Shandaken

KLB & Joe Quint obs 25 May 78

Pinus resinosa Ait.
Red Pine

Flora of
THE CATSKILLS
New York State



Greene County

Catskill Mts

Peck [n.d.]--NYS

Mink Hollow, vic of Haines Falls, Town of Hunter

H. Dunbar obs [n.d.]

N of Kaaterskill L, Town of Hunter

J. Bartram obs autumn 1753

Otis Summit, Town of Hunter

N. Taylor in Flora Vic. N. Y., p. 71, 1915.

W of Palenville, Town of Catskill

McIntosh obs Jul 61

Ulster County

Between Willow & Mt Tremper, Town of Woodstock

D. B. Cook obs 1 Dec 35

Goblin Cut, High Point Mt, Town of Olive

428 H. Dunbar 8 Aug 54--NYS

Pinus rigida Mill.
Pitch Pine

Flora of
THE CATSKILLS
New York State



Delaware County

Franklin, Town of Franklin
M. Platt, 1840

Greene County

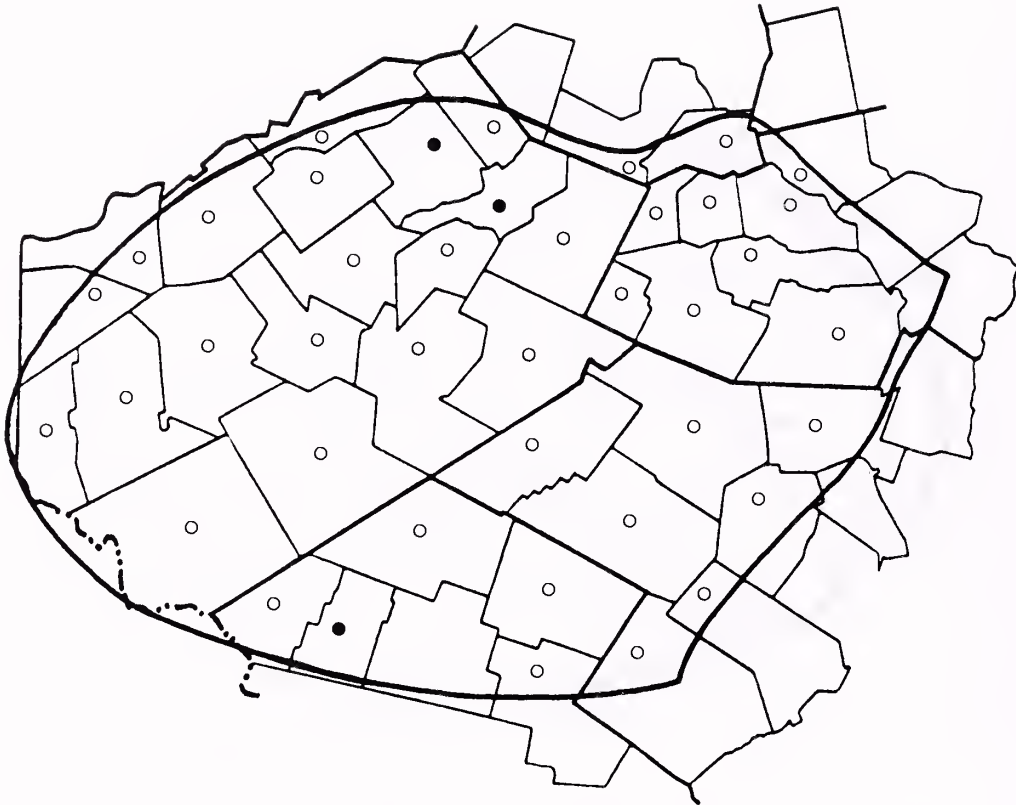
South L, Town of Hunter
SJS obs 30 Sep 63

Ulster County

High Point Mt, Town of Olive
11136 Moldenke 28 May 39--NY; 18256 Moldenke 1 Jun 46--NY

Pinus strobus L.
Eastern White Pine

Flora of
THE CATSKILLS
New York State



Delaware County

Franklin, Town of Franklin
M. Platt, 1840

Stamford, Town of Stamford
370 N. Taylor 3 Jun 09 at 1850 ft--NY

Delhi, Town of Delhi
N. Hotchkiss obs 10 May 27

Brookdale Farm, 3 mi s by w of W. Harpersfield, Town of Kortright
103 Brooks 6 May 51--Brooks, NYS

Point Mt, vic of Cadosia, Town of Hancock
SJS obs 17 Jun 54

1 1/2 mi sw of Odell L, Town of Harpersfield
KLB obs 2 Jul 55

Merrill Farm, 2 mi s of Treadwell, Town of Franklin
KLB obs 10 Jul 59

Rathbone Rd, 1 1/4 mi se of Pinders Corners, Town of Davenport
KLB obs 8 Aug 70

Pinus strobus

Rosa Farm, 1 mi s of Margaretville, Town of Middletown

T444 Brooks 3 May 70

Gregorytown, Town of Colchester

KLB obs 3 Jul 71

Delancey, Town of Hamden

KLB obs 7 Aug 71

Vic of Bovina, Town of Bovina

KLB obs 27 May 73

2 mi w by s of Grand Gorge, Town of Roxbury

KLB obs 30 Jul 73

Emmons Pond, Town of Davenport

R. Vitkus, A Floris. Descr. of Emmons' Pond Preserve [29 Aug 73]

1 mi e of Tompkins Falls, Town of Andes

KLB obs 12 May 74

2 mi s of E. Meredith, Town of Meredith

KLB obs 24 Jun 74

Vic of Launt Pond, Town of Walton

KLB obs 28 Jul 74

Vic of Stilesville, Town of Deposit

KLB obs 10 Aug 75

7 mi e by n of Deposit, Town of Tompkins

KLB obs 10 Aug 75

3 mi nw of Trout Creek, Town of Masonville

KLB obs 7 Sep 75

Vic of Sidney Center, Town of Sidney

KLB obs 7 Sep 75

Greene County

South L, Town of Hunter

SJS obs 7 Sep 57

Vic of West Kill, Town of Lexington

KLB obs 13 Sep 73

Vic of Prattsville, Town of Prattsville

KLB obs 4 Jul 74

3 mi e of Jewett Center, Town of Jewett

KLB obs 10 Sep 74

3 mi n of Halcott Center, Town of Halcott

KLB obs 31 May 75

2 mi sw of Ashland, Town of Ashland

KLB obs 1 Jul 75

2 mi n of Windham, Town of Windham

KLB obs 21 Jul 75

Vic of Durso Corner, Town of Durham

KLB obs 23 Sep 75

Schoharie County

Vic of W. Conesville, Town of Conesville

KLB obs 1 Jul 75

Pinus strobus

Vic of S. Gilboa, Town of Gilboa
KLB obs 22 Sep 75

Sullivan County

Vic of L Shandeelee, Town of Callicoon
P. Wilson 22 Aug 18--NY
1 mi sw of Lew Beach, Town of Rockland
KLB obs 3 Jun 74
Vic of Claryville, Town of Neversink
KLB obs 11 Jun 74
3 mi n of Woodbourne, Town of Fallsburg
KLB obs 2 Aug 76
Vic of Long Eddy, Town of Fremont
KLB & Phil Caswell obs 14 Sep 78

Ulster County

Woodland Valley, 4 mi e of Phoenicia, Town of Shandaken
O. P. Medsger in Mem. Torr. Bot. Club 17: 294-300, 1917.
Headwaters of Rondout Creek, Town of Denning
SJS obs 12 Sep 59
South Hill Rd, n of Ulster Heights, Town of Warwarsing
KLB & Mary Domville obs 11 Jul 70
Overlook Mt, Town of Woodstock
KLB & Mary Domville obs 12 Jul 70
Friedberg Place, 1 mi sw of Boiceville, Town of Olive
KLB & Claire Friedberg obs 18 Jul 73
Vic of Hardenburgh, Town of Hardenburgh
KLB obs 14 May 74
3 mi nw of Tabasco, Town of Rochester
KLB & Paul Huth obs 19 Aug 76

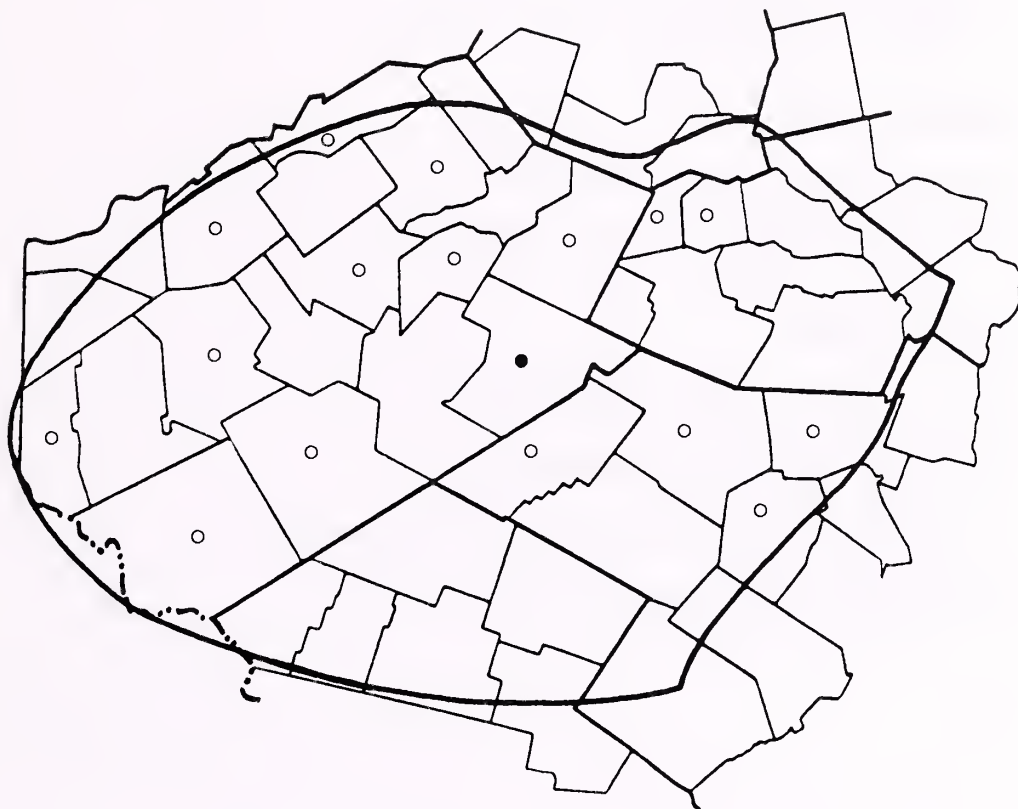
Picea abies (continued from p. 95)

Greene County

Vic of Red Falls, Town of Prattsville
KLB obs 14 Sep 75

Pinus sylvestris L.
Scotch Pine

Flora of
THE CATSKILLS
New York State



Delaware County

2 mi n of New Kingston, Town of Middletown

4798 Brooks 2 Jun 68--Brooks, NYS

Rosæ Farm, 1 mi s of Margaretville, Town of Middletown

T463 Brooks 10 May 70; BW8-09 Brooks 12 Sep 71

Lake Delaware, Town of Bovina

KLB obs 24 Aug 72

Vic of Gregorytown, Town of Colchester

KLB obs 8 Jul 73

Vic of Centerville, Town of Hancock

KLB obs 8 Jul 73

Vic of Beerston, Town of Walton

KLB obs 8 Jul 73

Betty's Brook Rd, 1 mi nw of S. Kortright, Town of Kortright

KLB obs 24 Jun 74

3 mi sw of Delhi, Town of Delhi

KLB obs 29 Jun 75

Pinus sylvestris

1/2 mi s of Davenport, Town of Davenport

KLB obs 30 Sep 75

Vic of Merrickville, Town of Franklin

KLB obs 6 Jul 76

Vic of Hambleville, Town of Deposit

KLB obs 6 Jul 76

2 1/2 mi se of Roxbury, Town of Roxbury

KLB obs 18 Jul 76

Greene County

Vic of Ashland, Town of Ashland

KLB obs 25 Jul 76

Vic of Prattsville, Town of Prattsville

KLB obs 17 Aug 76

Ulster County

Vic of Allaben, Town of Shandaken

KLB obs 29 Jun 73

Vic of Willow, Town of Woodstock

KLB obs 11 Jul 73

Vic of Belle Ayre Village, Town of Hardenburgh

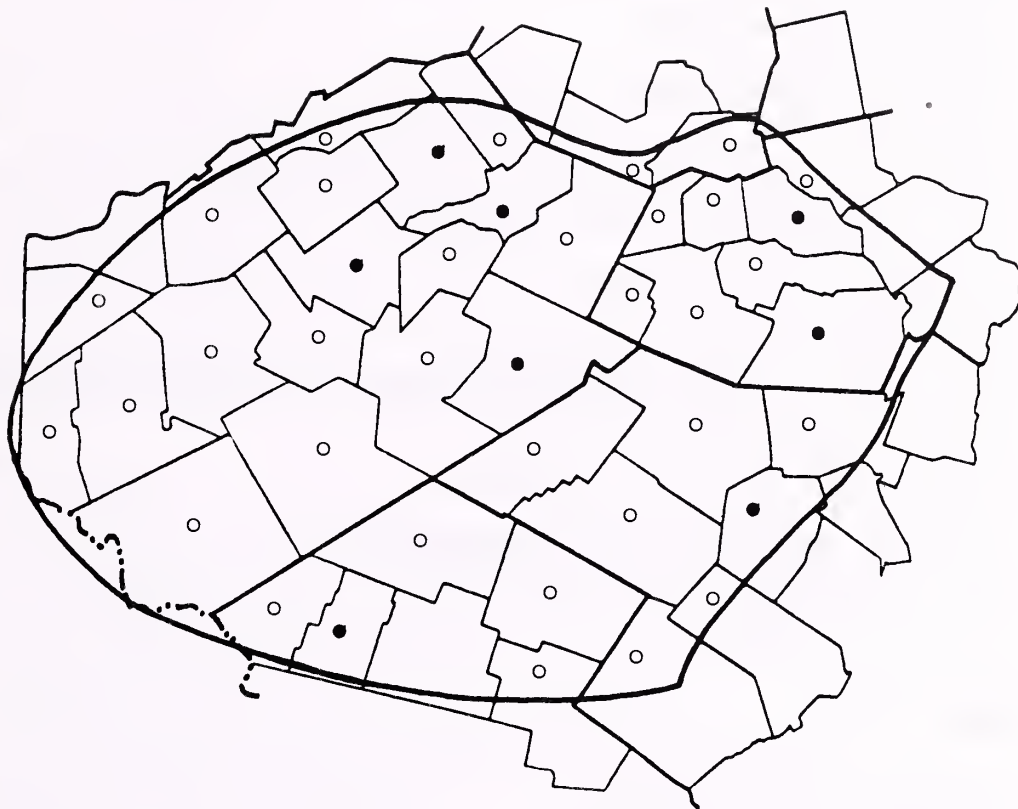
KLB obs 8 Jul 75

Vic of Boiceville, Town of Olive

KLB obs 11 Jun 76

Tsuga canadensis (L.) Carr.
Eastern Hemlock

Flora of
THE CATSKILLS
New York State



Delaware County

Franklin, Town of Franklin

M. Platt, 1840

Stamford at 1800 ft, Town of Stamford

377 N. Taylor 3 Jun 09--NY

Arkville, Town of Middletown

396 N. Taylor 3-7 Jun 09--NY

2 mi sw of Grand Gorge, Town of Roxbury

119 Brooks, Smith et al. 12 May 51--Poor specimen; destroyed

Bullet Hollow Rd, 5 mi nw of Andes, Town of Delhi

1456 Brooks 31 May 52--NYS

Point Mt, vic of Cadosia, Town of Hancock

SJS obs 17 Jun 54

Vic of W. Harpersfield, Town of Harpersfield

Smith & DeGroot obs 20 Sep 63

The Vlaih, 1 1/2 mi s of Oneonta, Town of Franklin

Smith & DeGroot obs 21 Sep 63

Tsuga canadensis

1/2 mi w by s of W. Harpersfield, Town of Kortright

4101 Brooks 9 Jun 56--NYS

Rosa Farm, 1 mi s of Margaretville, Town of Middletown

T113 Brooks 6 Nov 65; BW3-18A & BW3-18 Brooks 4 Jul 68; BW4-10A Brooks
26 Aug 68

Gregorytown, Town of Colchester

KLB obs 3 Jul 71

Delancey, Town of Hamden

KLB obs 7 Aug 71

1 mi sw of Bovina Center, Town of Bovina

KLB obs 27 May 73

Big Pond Rd, 14 mi s by e of Andes, Town of Andes

KLB obs 6 Jun 73

6 mi e of Downsville, Town of Colchester

KLB obs 12 Jun 73

Vic of Apex, Town of Tompkins

KLB obs 8 Jul 73

Emmons Pond, Town of Davenport

R. Vitkus, A Floris. Descr. of Emmons' Pond Preserve [29 Aug 73]

2 mi se of Walton, Town of Walton

KLB obs 28 Jul 74

Vic of Stilesville, Town of Deposit

KLB obs 10 Aug 75

3 mi nw of Trout Creek, Town of Masonville

KLB obs 7 Sep 75

2 mi sw of Meridale, Town of Meredith

KLB obs 21 May 76

Greene County

Onteora woods, Town of Hunter

Anna M. Vail Sep 1891--NY

Tannersville, Town of Hunter

284 N. Taylor 1 Jun 09--NY

Windham, Town of Windham

805 N. Taylor at 1700 ft 28-31 Jul 09--NY

Deep Notch, vic of West Kill, Town of Lexington

SJS obs 15 Jun 56

Prattsville, Town of Prattsville

KLB obs 19 Jun 73

Elk Creek Rd, 2 mi ne of Halcott Center, Town of Halcott

KLB obs 24 Jul 73

2 mi s of Jewett, Town of Jewett

KLB obs 1 Jul 75

Vic of E. Ashland, Town of Ashland

KLB obs 4 Jul 75

Vic of Durso Corner, Town of Durham

KLB obs 2 May 76

Tsuga canadensis

Schoharie County

Vic of Conesville, Town of Conesville

KLB obs 1 Jul 75

Vic of S. Gilboa, Town of Gilboa

KLB obs 22 Sep 75

Sullivan County

Vic of L Shandelea, Town of Callicoon

P. Wilson 25 Aug 18--NY

Fir Brook Swamp, vic of Willowemoc, Town of Neversink

SJS obs 5 Oct 50

E side of Long Eddy, Town of Fremont

SJS obs 7 Sep 56

1 mi sw of Lew Beach, Town of Rockland

KLB obs 3 Jun 74

3 mi n of Woodbourne, Town of Fallsburg

KLB obs 2 Aug 76

Ulster County

Woodland Valley, 4 mi e of Phoenicia, Town of Shandaken

O. P. Medsger in Mem. Torr. Bot. Club 17: 294-300, 1917.

Vic of Boiceville, Town of Olive

731 H. Dunbar 22 Apr 54--NYS

Headwaters of Rondout Creek, Town of Denning

SJS obs 12 Sep 59

South Hill Rd, n of Ulster Heights, Town of Warwarsing

KLB & Mary Domville obs 11 Jul 70

Overlook Mt, Town of Woodstock

KLB & Mary Domville obs 12 Jul 70

5 1/2 mi se of Margaretville, Town of Hardenburgh

KLB obs 4 Sep 72

3 mi nw of Tabasco, Town of Rochester

KLB & Paul Huth obs 19 Aug 76

Juniperus communis L.
ssp. *depressa* (Pursh) Franco
Dwarf Juniper

Flora of
THE CATSKILLS
New York State



Delaware County

Merrill Farm, 2 mi s of Treadwell, Town of Franklin
4464 Brooks 10 Jul 59--Brooks, NYS
Cold Spring Hollow, 3 1/2 mi s by e of Margaretville, Town of Middletown
KLB obs 28 Jul 73
2 mi w by s of Grand Gorge, Town of Roxbury
KLB obs 30 Jul 73
6 mi e of Downsville, Town of Colchester
KLB obs 18 Jun 74
1/2 mi s of Davenport, Town of Davenport
KLB obs 30 Sep 75
Vic of S. Kortright, Town of Kortright
KLB obs 2 May 76

Greene County

Prattsville, Town of Prattsville
KLB obs 19 Jun 73

Juniperus communis ssp. *depressa*

Brunner Place, 4 mi n of Halcott Center, Town of Halcott

KLB obs 9 Jun 75

Vic of Windham, Town of Windham

KLB obs 2 May 76

Vic of W. Jewett, Town of Jewett

KLB obs 17 Aug 76

Vic of S. Durham, Town of Durham

KLB obs 30 Apr 78

Sullivan County

W of Obernburg, Town of Fremont

SJS obs 7 Sep 56

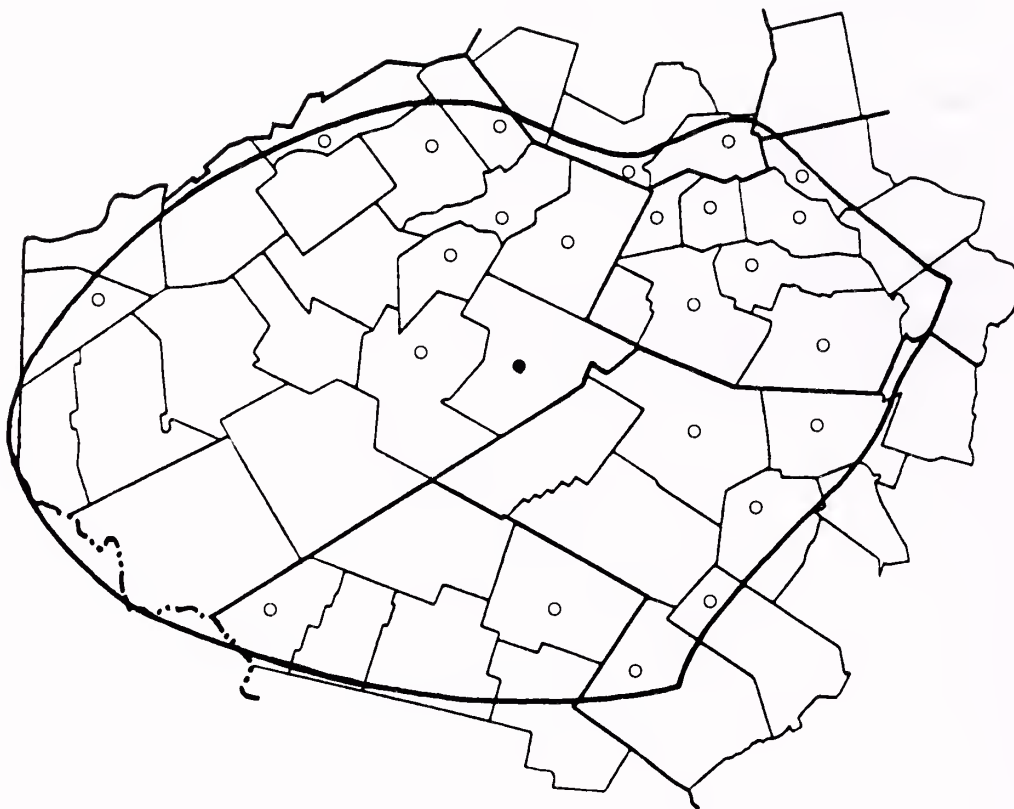
Ulster County

Vic of Willow, Town of Woodstock

KLB obs 11 Aug 76

Juniperus virginiana L.
Eastern Red Cedar

Flora of
THE CATSKILLS
New York State



Delaware County

E of Grand Gorge, Town of Roxbury

C. H. Diebold obs 1 Oct 30

Rosa Farm, 1 mi s of Margaretville, Town of Middletown

4728 Brooks 5 Sep 66--Brooks, NYS

Farmers Hill, 2 1/2 mi s of Andes, Town of Andes

KLB obs 26 May 73

3 mi n of Bovina Center, Town of Bovina

KLB obs 29 Sep 74

Hobart, Town of Stamford

KLB obs 21 May 75

3 mi nw of Trout Creek, Town of Masonville

KLB obs 7 Sep 75

1/2 mi e of Davenport, Town of Davenport

KLB obs 30 Sep 75

1 1/2 mi sw of Stamford, Town of Harpersfield

KLB obs 2 May 76

Juniperus virginiana

Vic of Bloomville, Town of Kortright
KLB obs 2 May 76

Greene County

Vic of Lexington, Town of Lexington
SJS obs 8 Jun 54
Vic of Prattsville, Town of Prattsville
KLB obs 4 Jul 74
Vic of Hunter, Town of Hunter
KLB obs 27 Jun 75
2 mi sw of Ashland, Town of Ashland
KLB obs 1 Jul 75
Vic of Beaches Corners, Town of Jewett
KLB obs 4 Jul 75
2 mi n of Windham, Town of Windham
KLB obs 21 Jul 75
Vic of S. Durham, Town of Durham
KLB obs 30 Apr 78

Schoharie County

Vic of Conesville, Town of Conesville
KLB obs 1 Jul 75
Vic of S. Gilboa, Town of Gilboa
KLB obs 22 Sep 75

Sullivan County

Vic of Obernburg, Town of Fremont
KLB obs 21 Jun 75
Vic of Grahamsville, Town of Neversink
KLB obs 2 Aug 76

Ulster County

Vic of Shandaken, Town of Shandaken
KLB obs 16 May 73
Friedberg Place, 1 mi sw of Boiceville, Town of Olive
KLB & Claire Friedberg obs 18 Jul 73
Vic of Willow, Town of Woodstock
KLB obs 7 May 75
3 mi nw of Tabasco, Town of Rochester
KLB & Paul Huth obs 19 Aug 76
2 mi n of Ulster Heights, Town of Warwarsing
KLB & Paul Huth obs 19 Aug 76

Thuja occidentalis L.
Eastern Arborvitae

Flora of
THE CATSKILLS
New York State



Delaware County

Vic of Apex, Town of Tompkins
6179 Brooks 27 Aug 75--Brooks, NYS

Ulster County

Oliverea, Town of Shandaken
678 H. Dunbar 27 May 54--NYS (a stand of over 100 trees)

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Brooks, Karl. 1979. A Catskill Flora and Economic Botany, vol. 1, Pteridophyta, The Ferns and Fern Allies. N.Y.S. Museum Bull. 438, 276 pp.

Mitchell, Richard S. & J. Kenneth Dean. 1978. Polygonaceae (Buckwheat Family) of New York State. Contr. to a Flora of New York State, I. N.Y.S. Museum Bull. 431, 81 pp.

Mitchell, Richard S. & Ernest O. Beal. 1979. Magnoliaceae through Ceratophyllaceae of New York State. Contr. to a Flora of New York State, II. N.Y.S. Museum Bull. 435, 62 pp.

Mitchell, Richard S. 1979. Preliminary Lists of Rare, Endangered and Threatened Plant Species in New York State. N.Y.S. Museum Leaflet 21, 18 pp.

Ogden, Eugene C. et al. 1976. Field Guide to the Aquatic Plants of Lake George, New York. N.Y.S. Museum Bull. 426, 65 pp.